Anritsu

SERVICE MANUAL

DS-3 TRANSMISSION ANALYZER

ME462B

ANRITSU CORP.

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DS-3 TRANSMISSION ANALYZER

ME462B

ANRITSU CORP.

1987.04 x 100 NIII-7(Y)
Printed in Japan

CERTIFICATION

ANRITSU CORP. certifies that this instrument has been thoroughly tested and inspected, and found to meet published specifications prior to shipping.
Anritsu further certifies that its calibration measurements are based on the Japanese Electrotechnical Laboratory and Radio Research Laboratory standards.

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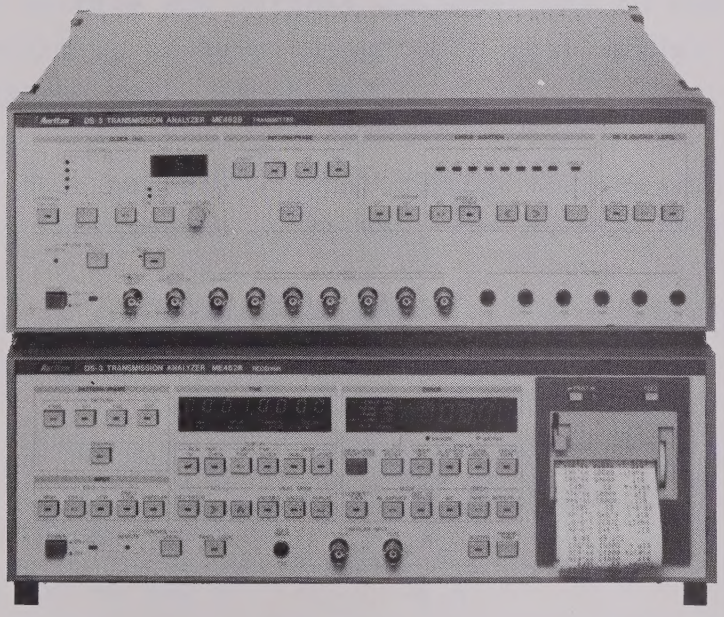


N O T E

(1) The instrument is operable on a nominal voltage from 100 to 127 Vac or from 200 to 250 Vac by changing the connections of the power transformer taps.

The voltage and current rating are indicated on the rear panel when the instrument is shipped from the factory.

In the case of other voltage operation, change the connections of the power supply transformer, and the plate of voltage and current designations on the rear panel should be changed to suitable one. Order the plates from ANRITSU CORP. if needed.

(2) In this manual, a power supply voltage and current rating are represented by ** Vac, *** A, and **** A.

(3) The relation between power supply voltage and current rating is listed below.

** Vac	(Transmitter) *** A	(Receiver) **** A
100 to 127 V	2 A	2 A
200 to 250 V	1 A	1 A

TABLE OF CONTENTS

		Page
SECTION 1	GENERAL	1-1
SECTION 2	MECHANICAL CONFIGURATION	2-1
2.1	Introduction	2-1
2.2	Disassembly	2-1
2.2.1	Separation of Transmitter and Receiver	2-1
2.2.2	Cabinet Disassembly	2-3
2.2.3	Transmitter Disassembly	2-5
2.2.4	Receiver Disassembly	2-9
2.3	Internal Views	2-15
SECTION 3	TROUBLESHOOTING	3-1
3.1	Introduction	3-1
3.2	Transmitter Troubleshooting	3-3
3.2.1	Power-ON Lamp Troubleshooting	3-4
3.2.2	Regulated DC Power Supply Troubleshooting	3-5
3.2.3	Front Panel LED or Key Switch Troubleshooting	3-10
3.2.4	External Clock Operation Troubleshooting	3-11
3.2.5	F1 to F5 Operation Troubleshooting	3-12
3.2.6	Jitter Modulation Troubleshooting	3-13
3.2.7	DS-3 Output Waveform Troubleshooting ...	3-17
3.2.8	Unipolar Clock Output (Frequency, Waveform) Troubleshooting ..	3-19

TABLE OF CONTENTS (Cont.)

		Page
3.2.9	Unipolar Data Output Waveform Troubleshooting	3-20
3.2.10	BSZ3 Converter Troubleshooting	3-22
3.2.11	Frame Signal Generator Troubleshooting ..	3-25
3.2.12	Pattern Generator Troubleshooting	3-30
3.2.13	Error Addition Circuit Troubleshooting ..	3-34
3.2.14	Sync Output Circuit Troubleshooting	3-36
3.2.15	Control Circuit Troubleshooting	3-37
3.2.16	GP-IB or RS-232C Interface Troubleshooting	3-39
3.3	Receiver Troubleshooting	3-40
3.3.1	Power-ON Lamp Troubleshooting	3-42
3.3.2	Regulated DC Power Supply Troubleshooting	3-43
3.3.3	Front Panel LED or Key Switch Troubleshooting	3-46
3.3.4	Error Circuit Troubleshooting	3-47
3.3.5	DS-3 Input Circuit Troubleshooting	3-48
3.3.6	B3ZS Reverse Conversion Circuit Troubleshooting	3-50
3.3.7	Unipolar Input Circuit Troubleshooting ..	3-51
3.3.8	Framing Circuit Troubleshooting	3-52
3.3.9	Error Detector Troubleshooting	3-55
3.3.10	Counter Circuit Troubleshooting	3-56
3.3.11	Error Seconds (ES) or Error Free Seconds (EFS) Circuit Troubleshooting	3-59

TABLE OF CONTENTS (Cont.)

		Page
3.3.12	Alarm Display or Buzzer Sound Circuit Troubleshooting	3-60
3.3.13	Measuring Time or Real-Time Circuit Troubleshooting	3-65
3.3.14	OUTPUT (CLOCK SYNC, MULTIFRAME SYNC, X-BIT, ERROR) Circuit Troubleshooting ...	3-67
3.3.15	Monitor Input Circuit Troubleshooting ...	3-69
3.3.16	Function Switch Troubleshooting	3-70
3.3.17	Control Circuit Troubleshooting	3-71
3.3.18	Printer Troubleshooting	3-73
3.3.19	GP-IB or RS-232C Interface Troubleshooting	3-75
3.4	Block Diagram and Circuit Diagram	3-77
SECTION 4	REPLACEABLE PARTS	4-1
4.1	Introduction	4-1
4.2	Capacitor/Resistor Reading Method	4-3
4.2.1	Capacitor	4-3
4.2.2	Resistor	4-4
4.3	Ordering Information	4-5
4.4	Component List	4-6

SECTION 1

GENERAL

This is the Service Manual for the ME462B DS-3 Transmission Analyzer. It covers the following information:

SECTION 2, MECHANICAL CONFIGURATION:

Describes how the various printed circuit boards (PC boards) are laid out.

SECTION 3, TROUBLESHOOTING:

Describes how to troubleshoot the equipment. Schematic diagrams for the equipment are given in this section.

SECTION 4, REPLACEABLE PARTS:

Explains how to order replacement parts and the component lists.

For the specifications, the operating instructions, performance check, and detailed panel control description of the ME462B, refer to the separate operation manual.

SECTION 2

MECHANICAL CONFIGURATION

2.1 Introduction

This section will explain methods of disassembling the equipment.

2.2 Disassembly

2.2.1 Separation of Transmitter and Receiver

As shown in Fig. 2-1 below, the receiver and the transmitter are locked together by 4 legs.

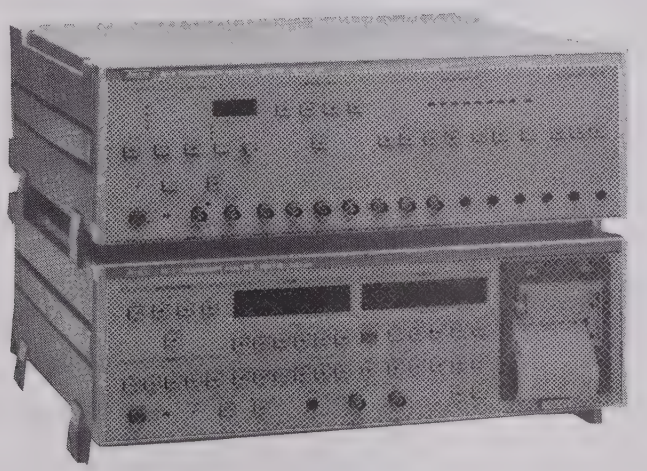


Fig. 2-1 Connection between transmitter and receiver

As shown in the detailed drawing of Fig. 2-2, the transmitter and the receiver are separated by lifting the locks.

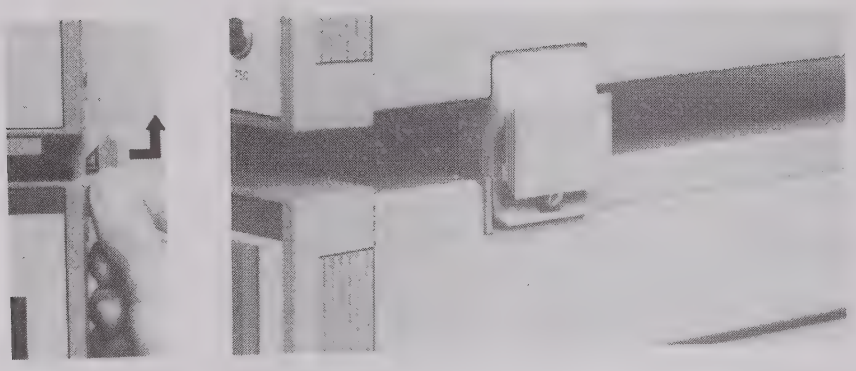
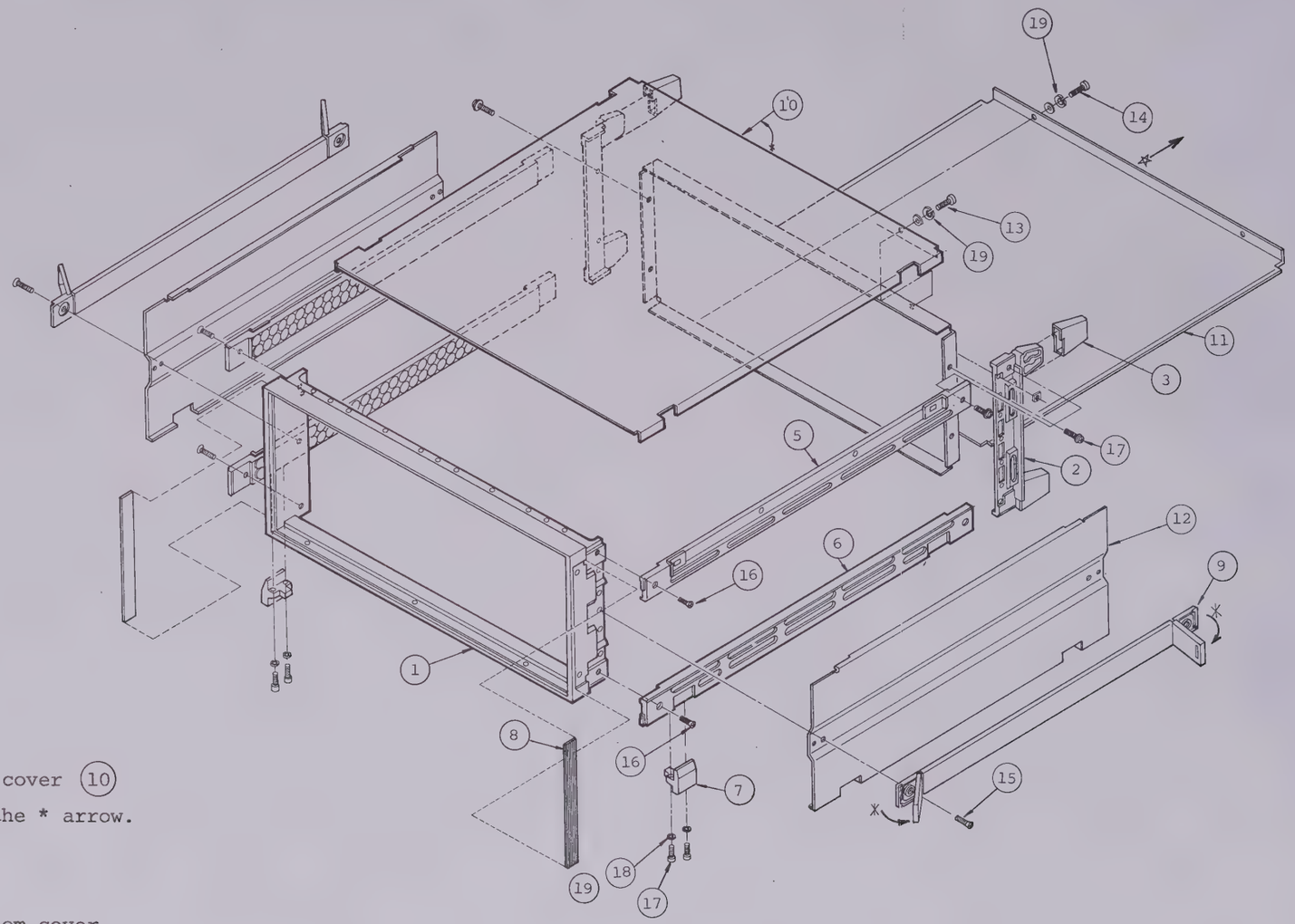


Fig. 2-2 Detailed view of leg

2.2.2 Cabinet Disassembly

No.	PART No.	DESCRIPTION	REMARKS	Q'TY
(1)	32B7661	Frame, Front	1MW·3U	1
(2)	32B7665	Channel, Rear	3U	2
(3)	33B20662	Protector		4
(4)		NOT ASSIGNED		
(5)	32B7668	Channel, Top	350D	2
(6)	32B7669	Channel, Bottom	350D	2
(7)	349B73667A	Foot, Stack		4
(8)	34B73660B	Tape, Trim	3U	2
(9)	349B73661B	Handle, Side	350D	2
(10)	33B22451	Cover, Top		1
(11)	33B22511	Cover, Bottom		1
(12)	33B22469	Cover, Side		2
(13)	4BPS8S3	Screw		2
(14)	4BPS8S3	Screw		2
(15)	5FPS12S7	Screw		4
(16)	5FPS10S7	Screw		8
(17)	4NPS20S7	Screw		8
(18)	4SW-SU	Spring Washer		8
(19)	4WBS-B3	Plain Washer		12



(1) Removing the top cover (10)

Remove the two screws (13). Then, remove the top cover (10) by lifting it from rear in the direction indicated by the * arrow.

(2) Removing the bottom cover (11)

Remove the two screws (14). Then, remove the bottom cover (11) from in the rear as indicated by the * arrow.

(3) Removing the side cover (12)

Open the cover of the handle (9) in the direction indicated by the * arrow and remove the two screws (15). Then, remove the side cover (12).

Fig. 2-3 Cabinet Disassembly

2.2.3 Transmitter Disassembly

NO.	PARTS NO.	DESCRIPTION	REMARKS	Q'TY
(1)	42B10697	Front Panel		1
(2)	422B10698	Plate, Sub-panel		1
(3)	422U10935	Z2 P.C. Board		1
(4)	422U10870	Z4 P.C. Board		1
(5)	44B76849	Filter		1
(6)	34B78330A	Clamp, Panel		3
(7)	34B78330B	Clamp, Panel		3
(8)	342E73701	Knob		1
(9)	44E68583	Button	Character; POWER	1
(10)	442E81136C	Button	Character; ≫	2
(11)	44E80830A	Button	Character; F1-F4 LOCAL, MODULATION, SINGLE	4
(12)	442E80831A	Button		15
(13)	3FPS10B3	Screw		6
(14)	3FPS8B3	Screw		5
(15)	3NPS6B3+SW	Screw		17
(16)	3NPS10B3+SW	Screw		5
(17)	3A0S3	Screw		1

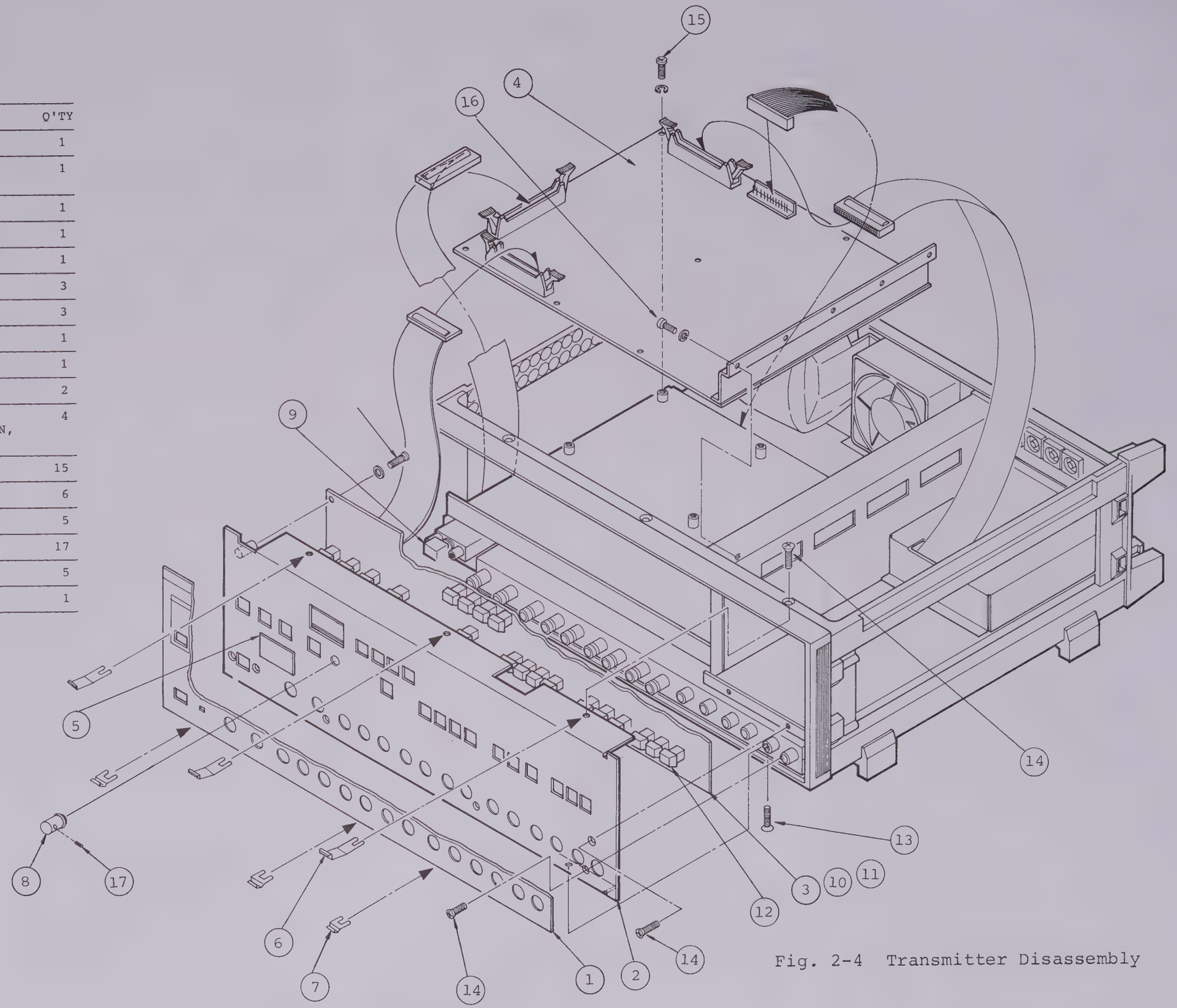
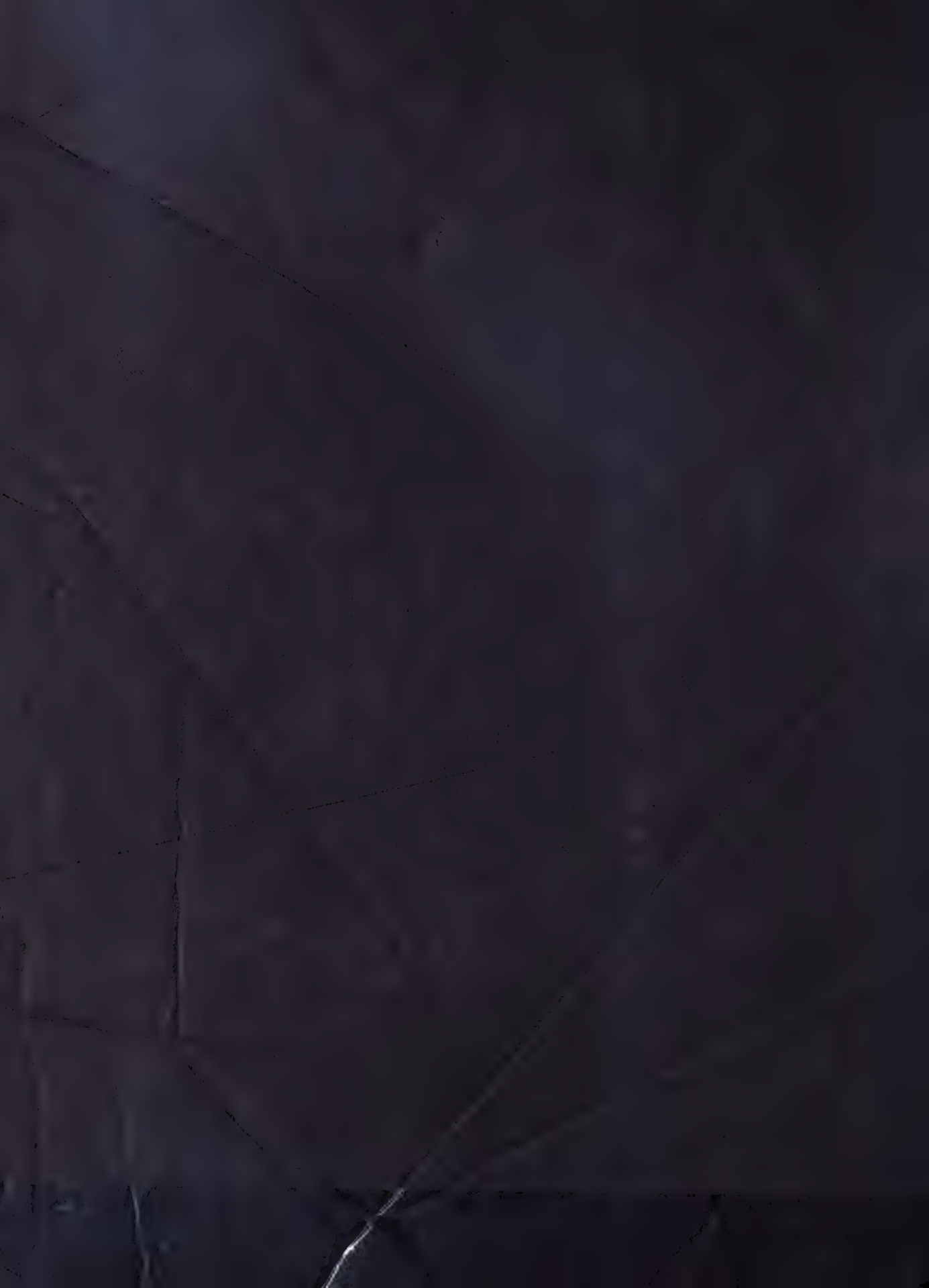
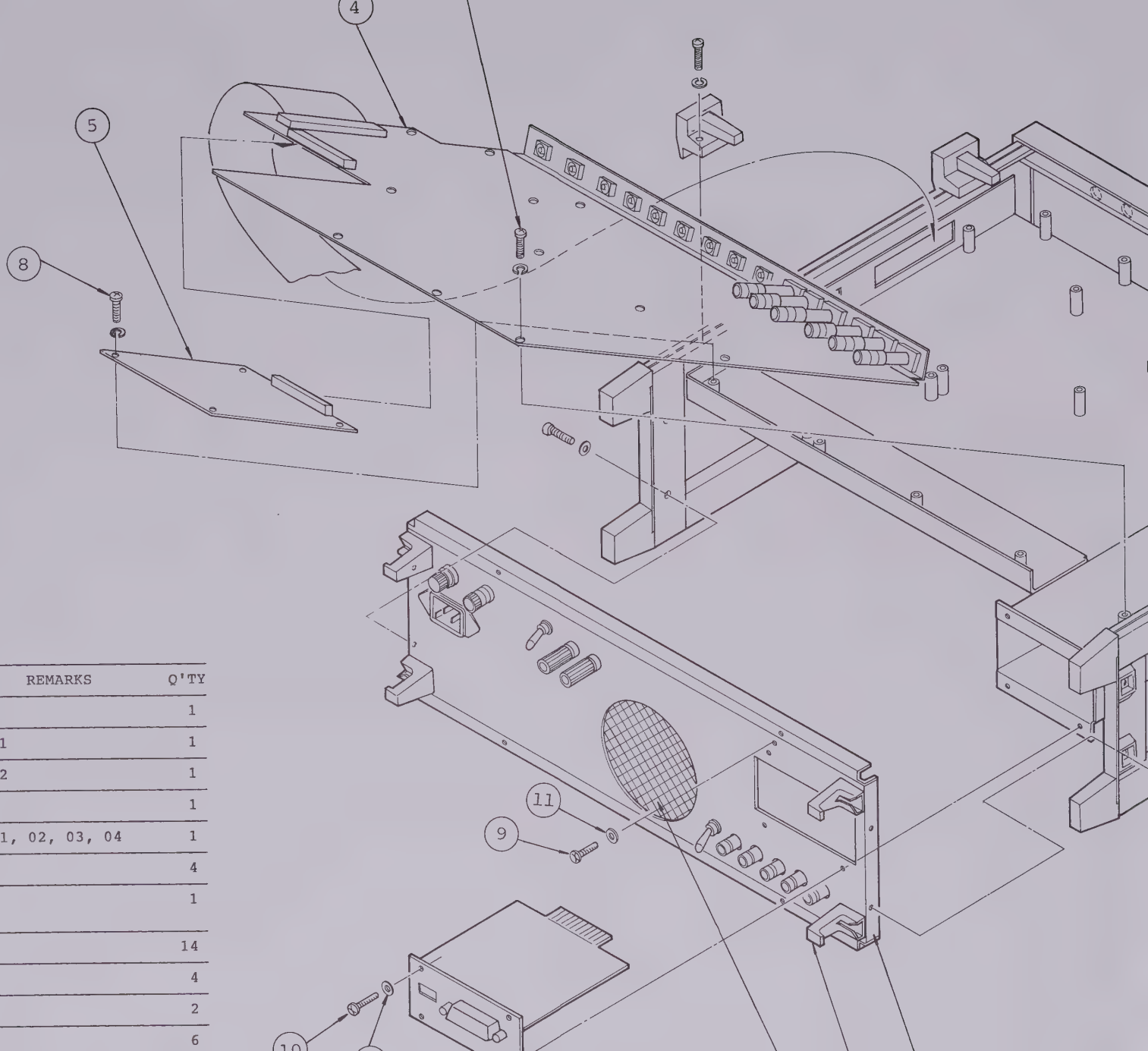
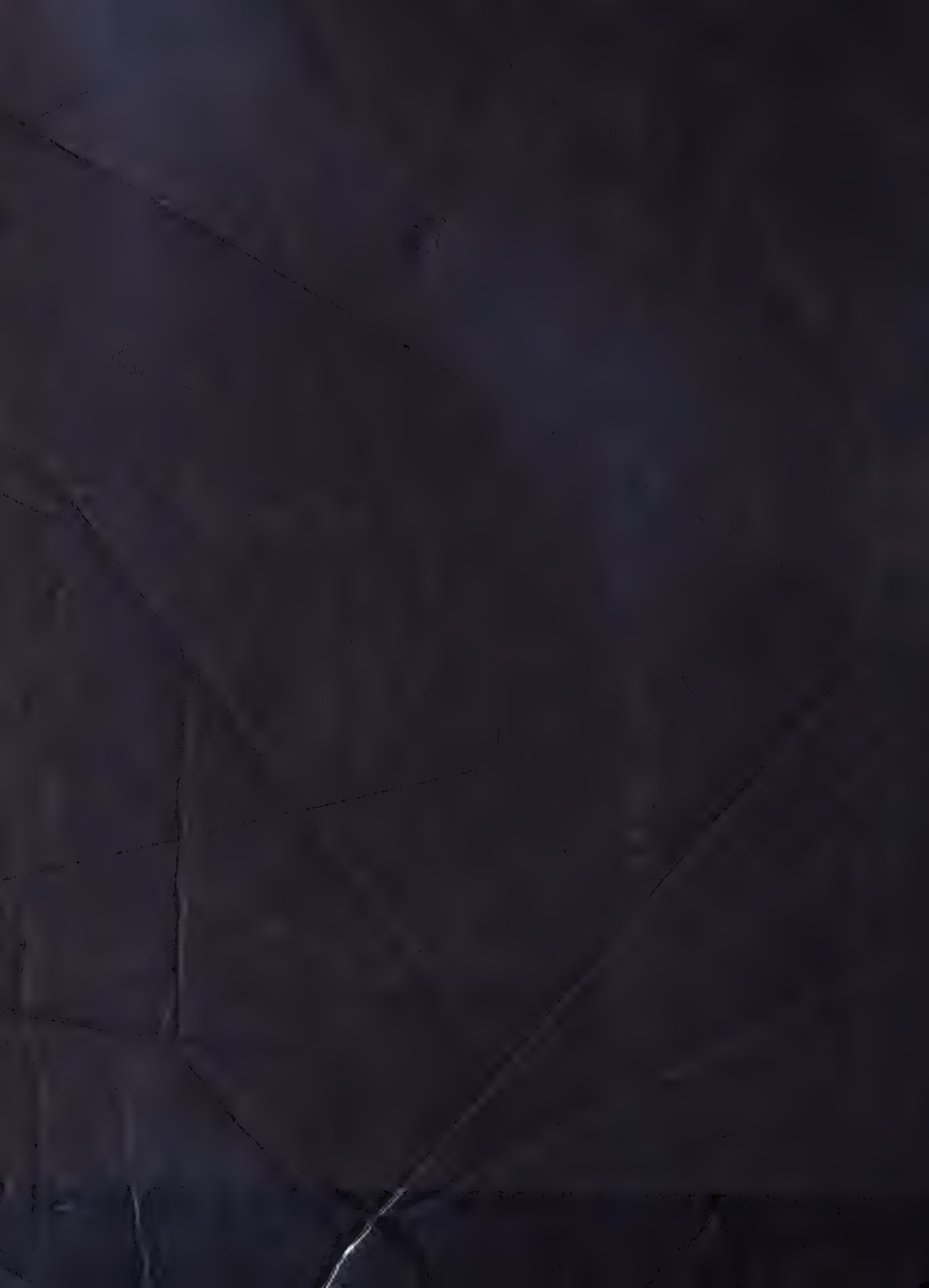


Fig. 2-4 Transmitter Disassembly

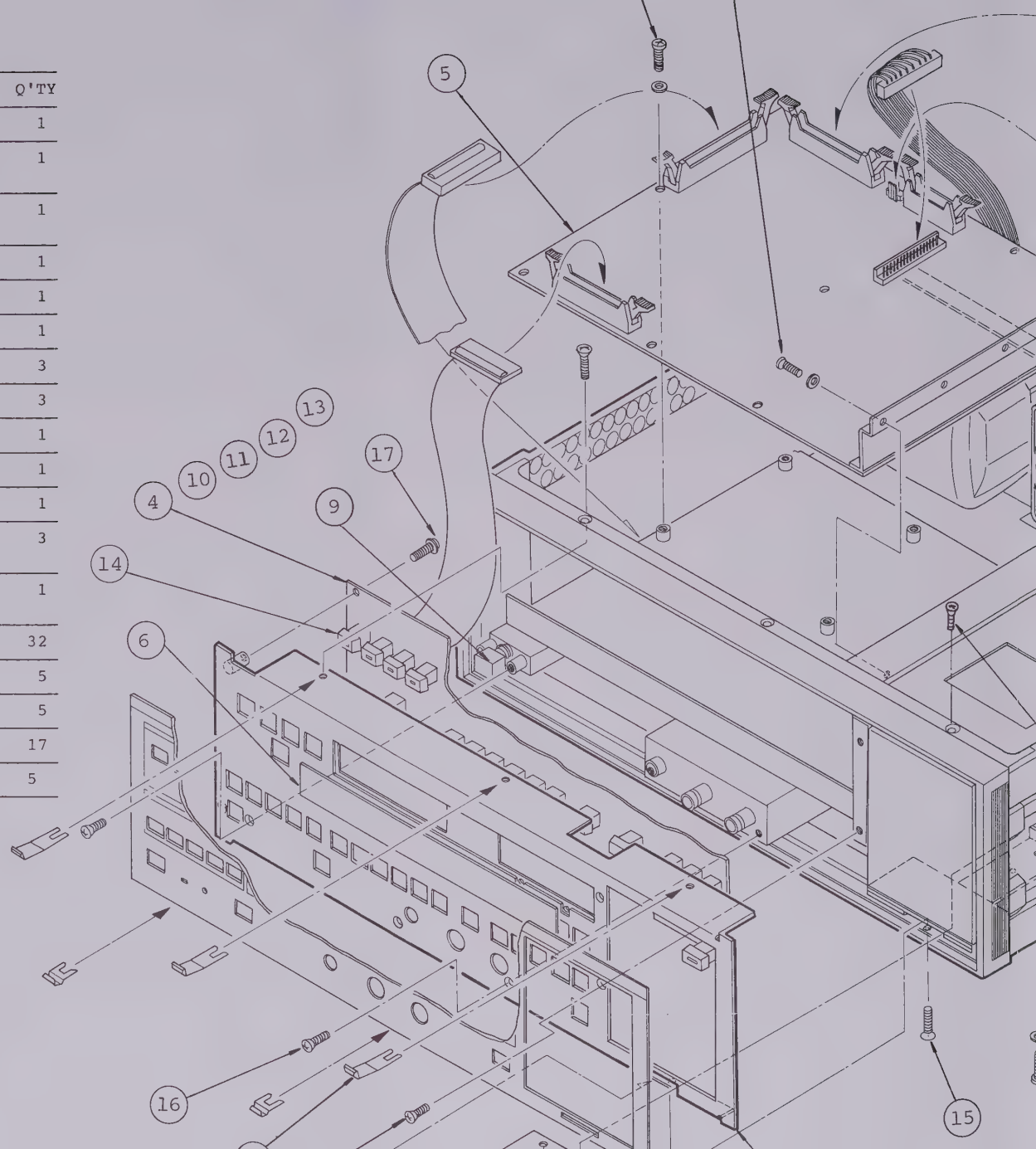


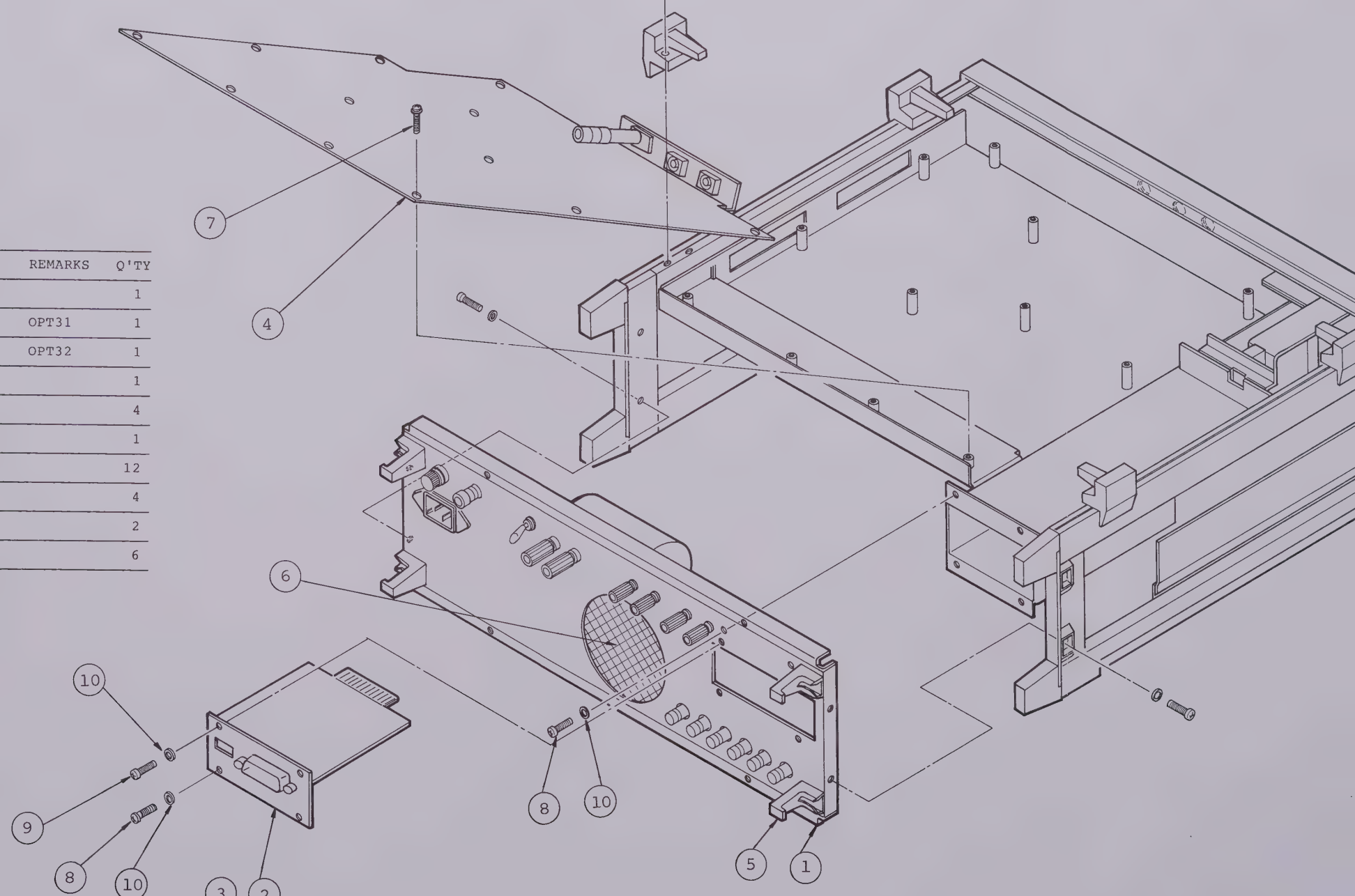


ARTS NO.	DESCRIPTION	REMARKS	Q'TY
2B10707A	Rear Panel		1
4Y78601A	GP-IB	OPT21	1
4Y78601B	RS-232C	OPT22	1
22U10937	Z3 P.C. Board		1
42U78588	Z5 P.C. Board	OPT01, 02, 03, 04	1
4B73670	Cord Holder		4
4B64690	Protective Mesh Cover		1
NPS6B3+SW	Screw		14
BPS10B3	Screw		4
NPS8B3+SW	Screw		2
WBS-B3	Plain Washer		6



	PARTS NO.	DESCRIPTION	REMARKS	Q'TY
	42B10737	Front Panel		1
	422B10738	Plate, Sub-panel		1
	44B76995	Plate, Printer eject		1
	422U10872	Z4 P.C. Board		1
	422U10851	Z2 P.C. Board		1
	44B76996	Filter		1
	34B78330A	Clamp, Panel		3
	34B78330B	Clamp, Panel		3
	44E68583	Button	Character; POWER	1
	442E81136A	Button	Character; ∧	1
	442E81136C	Button	Character; >	1
	44E80830A	Button	Character; RESET, LOCAL, PRINT	3
	44E80830B	Button	Character; START/STOP	1
	442E80831	Button		32
	3FPS10B3	Screw		5
	3FPS8B3	Screw		5
	3NPS6B3+SW	Screw		17
	3NPS10B3+SW	Screw		5

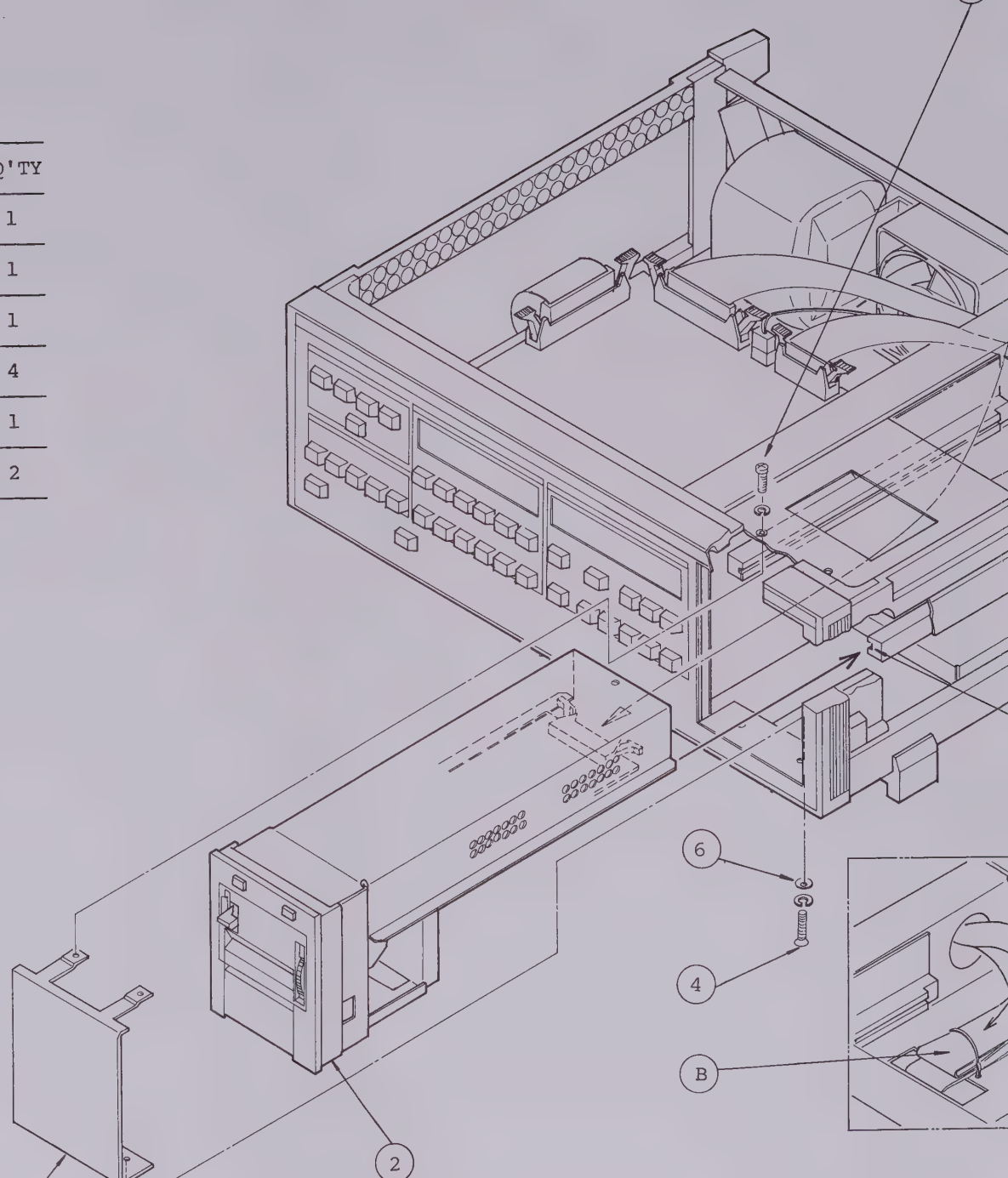




REMARKS	Q'TY
	1
OPT31	1
OPT32	1
	1
	4
	1
	12
	4
	2
	6

Fig. 2-7 Receiver Disas
(Rear Panel)

PARTS NO.	DESCRIPTION	REMARKS	Q'TY
442B77043	Blank Panel		1
44Y76992	Printer	OPT11	1
HIF3A-20D-AA50S	J20 Cable		1
3NPS8B3+SW	Screw		4
4NPS8B3+SW+WB	Screw		1
3WB-B3	Plain Washer		2



2.3 Internal Views

The following Figs. 2-9 to 2-12 show the top/bottom views uncovering the top/bottom plate of the transmitter and the receiver.

Some of the parts location (P.C. Board with Z number, J: connector, T: transformer, and G: fan) are shown with arrow.

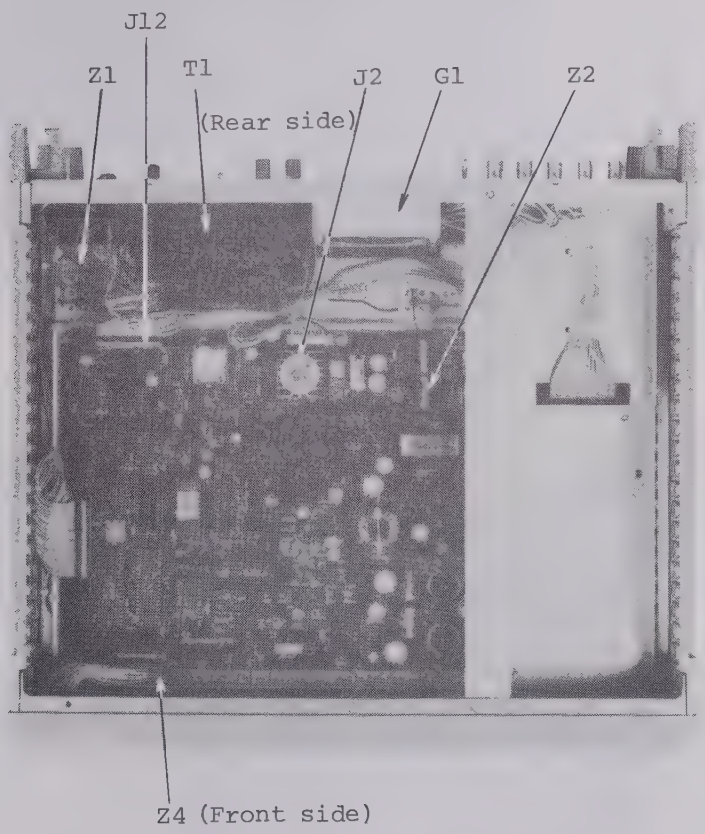


Fig. 2-9 Top View of Transmitter

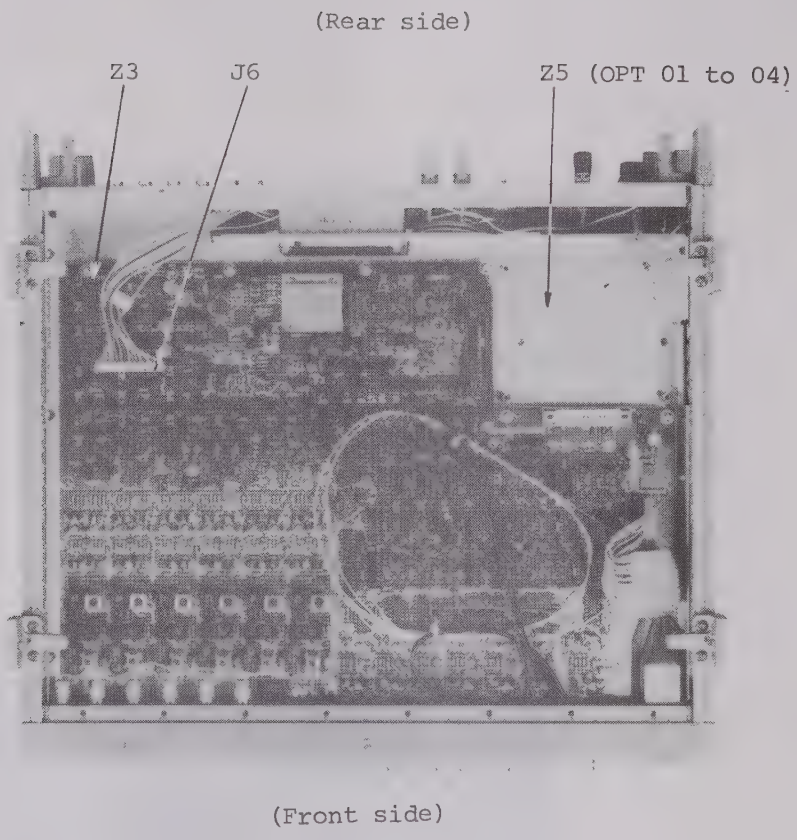


Fig. 2-10 Bottom View of Transmitter

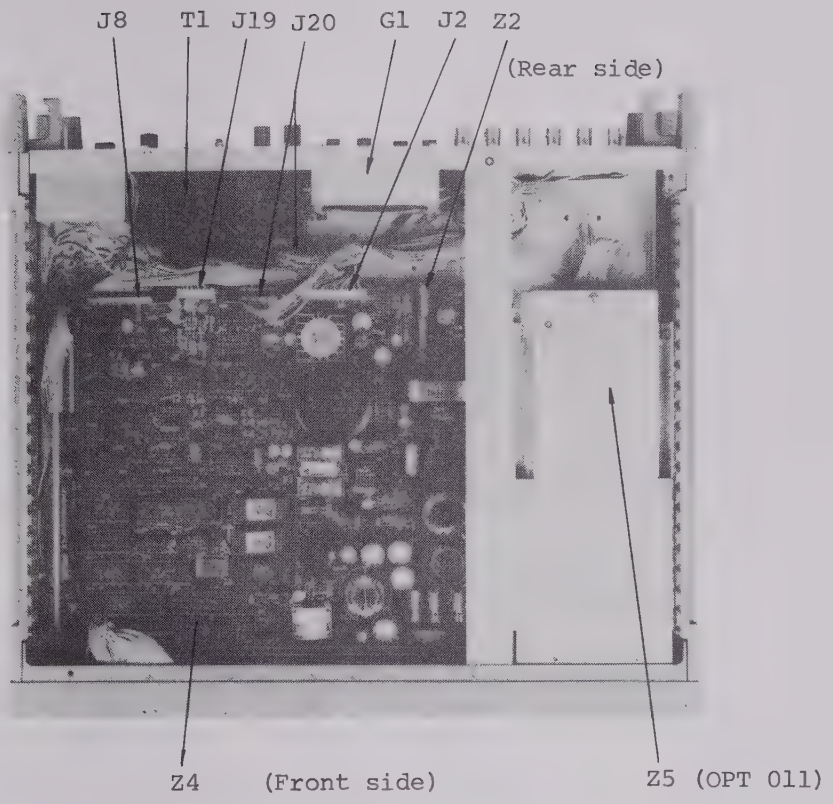


Fig. 2-11 Top View of Receiver

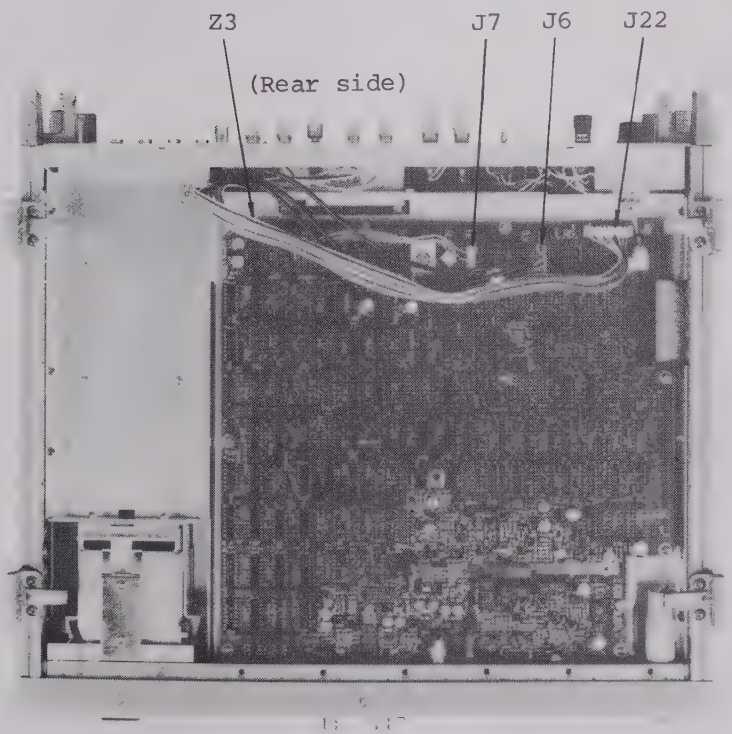


Fig. 2-12 Bottom View of Receiver

SECTION 3

TROUBLESHOOTING

3.1 Introduction

This section explains the troubleshooting procedures if the calibration shown in SECTION 4 of the Operation Manual fails. Troubleshooting can be diagrammed as follows.

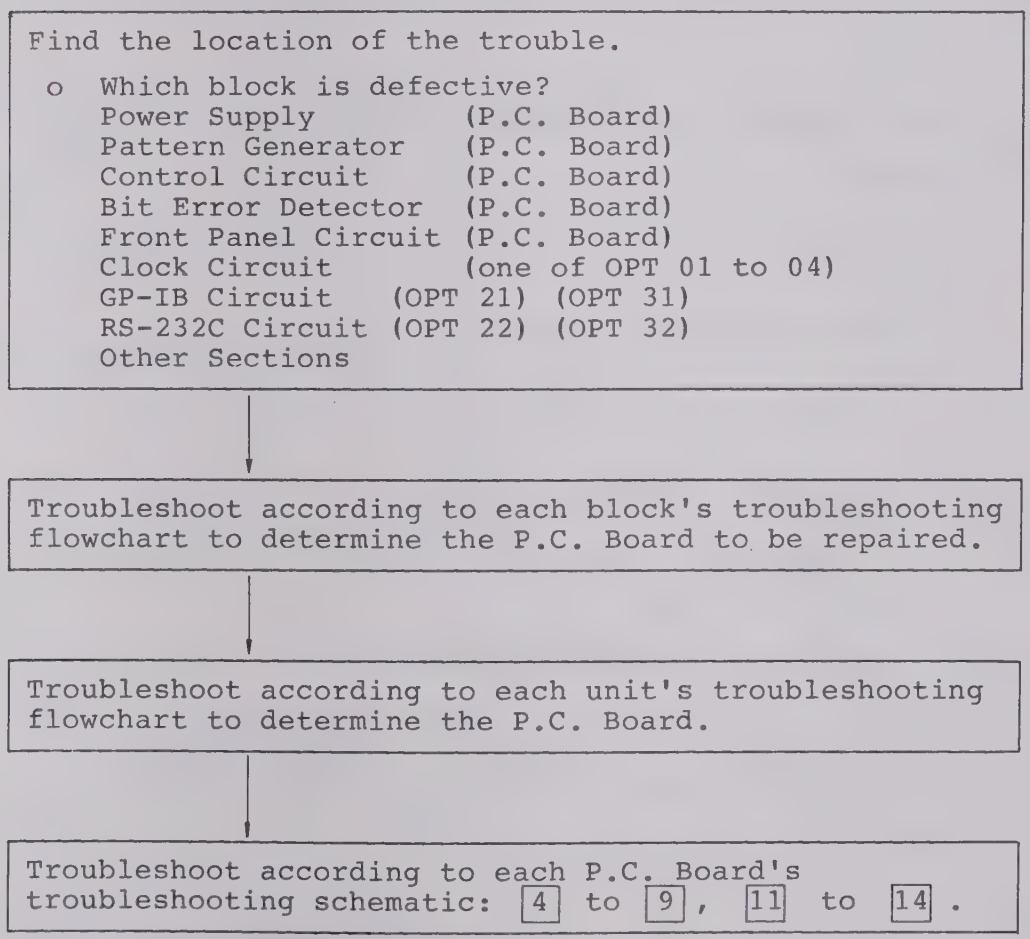

Find the location of the trouble.
o Which block is defective?
Power Supply (P.C. Board)
Pattern Generator (P.C. Board)
Control Circuit (P.C. Board)
Bit Error Detector (P.C. Board)
Front Panel Circuit (P.C. Board)
Clock Circuit (one of OPT 01 to 04)
GP-IB Circuit (OPT 21) (OPT 31)
RS-232C Circuit (OPT 22) (OPT 32)
Other Sections
Troubleshoot according to each block's troubleshooting flowchart to determine the P.C. Board to be repaired.
Troubleshoot according to each unit's troubleshooting flowchart to determine the P.C. Board.
Troubleshoot according to each P.C. Board's troubleshooting schematic: 4 to 9, 11 to 14.

Fig. 3-1 Troubleshooting Procedure

The block diagram for ME462B [1], [2] will serve as the basis for troubleshooting judgements.

When a failure occurs with the equipment, each the faulty circuit is described as follows:

(1) Transmitter failure

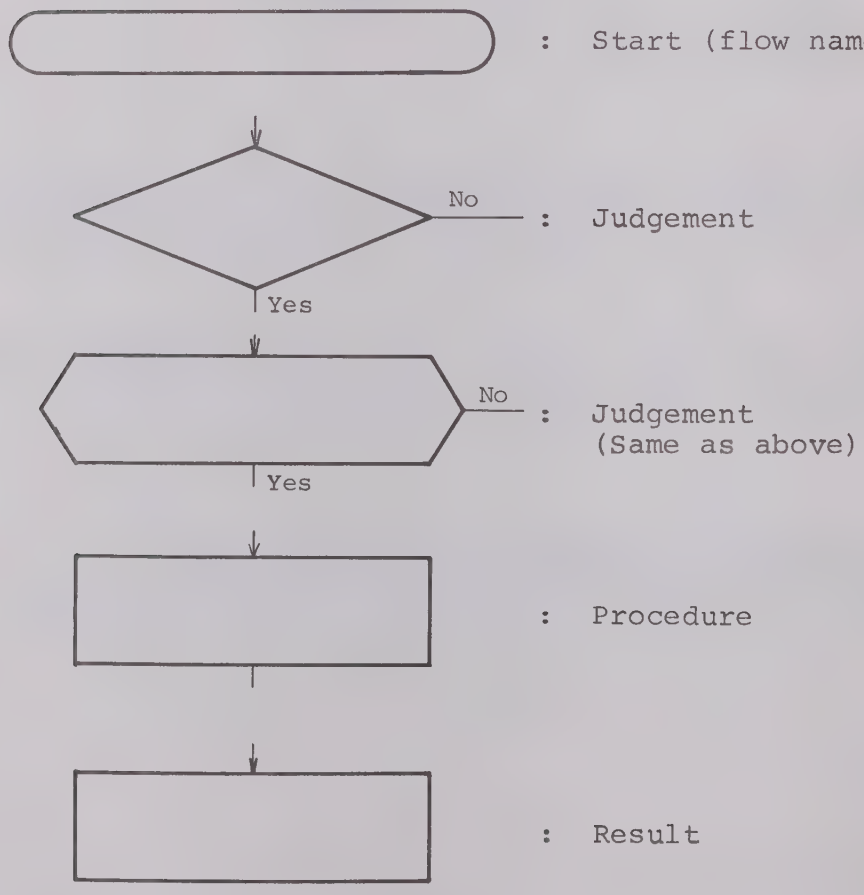
See paragraph 3.2 Transmitter Troubleshooting.

(2) Receiver failure

See paragraph 3.3 Receiver Troubleshooting.

The circled numbers in each flowchart show the check point number in the circuit diagram and parts layout Diagram.

In this flowchart, following symbols are used.



3.2 Transmitter Troubleshooting

When a failure occurs with the ME462B transmitter, select the corresponding item from the following Troubleshooting items and make repairs in accordance with the flow in each one.

Troubleshooting Items

(1) Power on lamp does not light.

(2) DC regulated power supply (+5 V, -5.2 V, +12 V, -2 V) is faulty.

(3) Front panel LED or key switch is faulty.

(4) Operation by external clock is faulty.

(5) Operation by F1 to F4 (OPT 01 to 04) is faulty.

(6) Jitter modulation is faulty.

(7) DS-3 output waveform is faulty.

(8) Unipolar clock output (frequency waveform) is faulty.

(9) Unipolar data output waveform is faulty.

(10) Bipolar violation is detected.

(11) Frame sync loss or parity errors are detected.

(12) Pattern sync loss or bit errors are detected.

(13) Error addition is faulty.

(14) Sync output is faulty.

(15) Control circuit is faulty.

(16) GP-IB or RS 232C interface is faulty.

3.2.1 Power-ON Lamp Troubleshooting

Refer to
- 3 Overall Circuit of Transmitter: 43W30643 (1/2)
- 4 Power Supply Circuit (Z2) : 43W30644 (1/5, 5/5)
- 6 Front Panel Circuit (Z4) : 43W30646 (3/3)

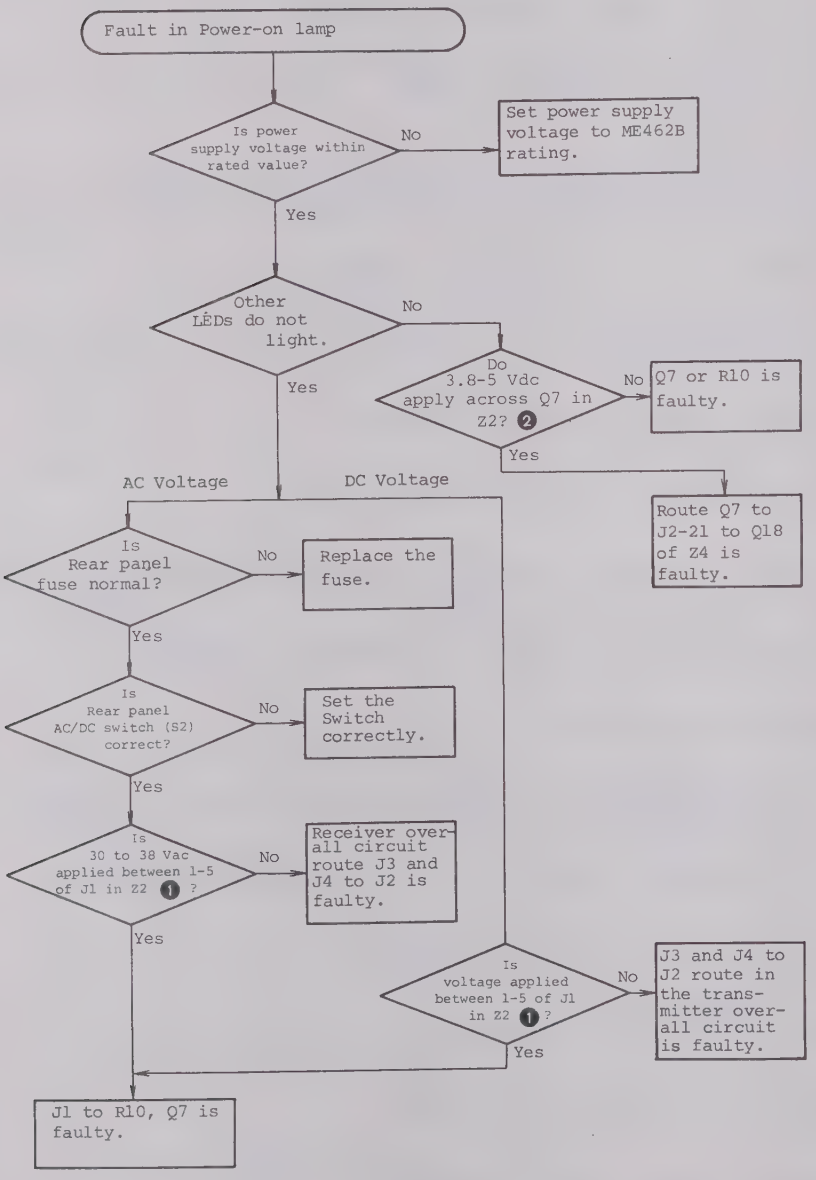

Fault in Power-on lamp
Is power supply voltage within rated value?
No
Set power supply voltage to ME462B rating.
Yes
Other LEDs do not light.
No
Do 3.8-5 Vdc apply across Q7 in Z2? ❷
No
Q7 or R10 is faulty.
Yes
Route Q7 to J2-21 to Q18 of Z4 is faulty.
Yes
AC Voltage
DC Voltage
Is Rear panel fuse normal?
No
Replace the fuse.
Yes
Is Rear panel AC/DC switch (S2) correct?
No
Set the Switch correctly.
Yes
Is 30 to 38 Vac applied between 1-5 of J1 in Z2 ❶ ?
No
Receiver over-all circuit route J3 and J4 to J2 is faulty.
Yes
Is voltage applied between 1-5 of J1 in Z2 ❶ ?
No
J3 and J4 to J2 route in the transmitter over-all circuit is faulty.
Yes
J1 to R10, Q7 is faulty.

Fig. 3-2 Power ON Lamp Troubleshooting Flowchart

3.2.2 Regulated DC Power Supply Troubleshooting

Refer to [4] : Power Supply Circuit (Z2): 43W30644 (1/5)

NOTE

When the +5 V or +12 V power supply is faulty, the following checks must be made step by step within 1 second. That is, after the power is turned on and checks are made for approximately 1 second, immediately turn the power off. For the next step, wait 5 to 6 seconds before turning the power on again, then perform the checks for 1 second and turn the power off. If this is not done, R14 may burn out.

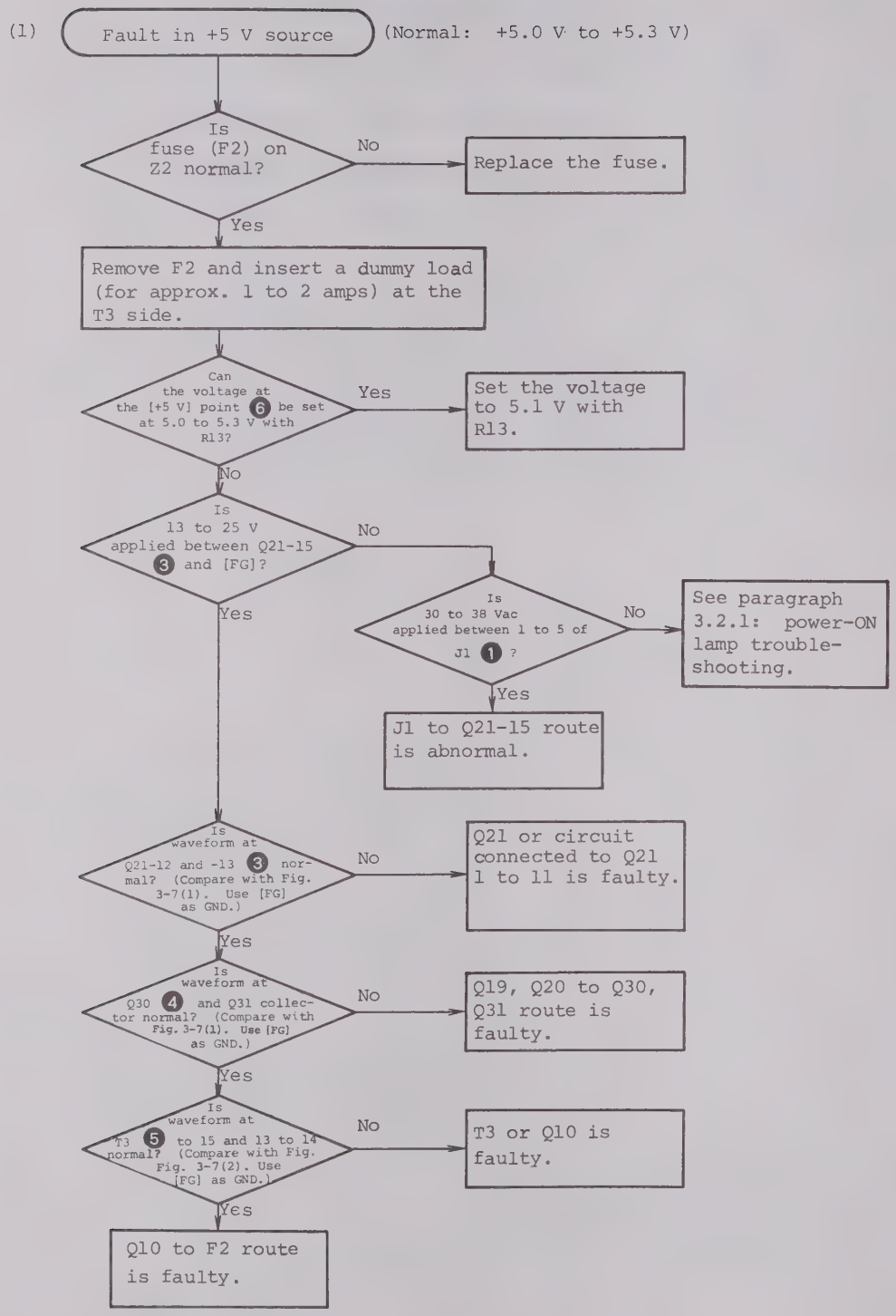

(1)
Fault in +5 V source
(Normal: +5.0 V to +5.3 V)
Is fuse (F2) on Z2 normal?
No
Replace the fuse.
Yes
Remove F2 and insert a dummy load (for approx. 1 to 2 amps) at the T3 side.
Can the voltage at the [+5 V] point 6 be set at 5.0 to 5.3 V with R13?
Yes
Set the voltage to 5.1 V with R13.
No
Is 13 to 25 V applied between Q21-15 3 and [FG]?
No
Is 30 to 38 Vac applied between 1 to 5 of J1 1 ?
No
See paragraph 3.2.1: power-ON lamp trouble-shooting.
Yes
J1 to Q21-15 route is abnormal.
Yes
Is waveform at Q21-12 and -13 3 normal? (Compare with Fig. 3-7(1). Use [FG] as GND.)
No
Q21 or circuit connected to Q21 1 to 11 is faulty.
Yes
Is waveform at Q30 4 and Q31 collector normal? (Compare with Fig. 3-7(1). Use [FG] as GND.)
No
Q19, Q20 to Q30, Q31 route is faulty.
Yes
Is waveform at T3 5 to 15 and 13 to 14 normal? (Compare with Fig. Fig. 3-7(2). Use [FG] as GND.)
No
T3 or Q10 is faulty.
Yes
Q10 to F2 route is faulty.

Fig. 3-3 Regulated DC Power Supply Troubleshooting Flowchart (+5 V)

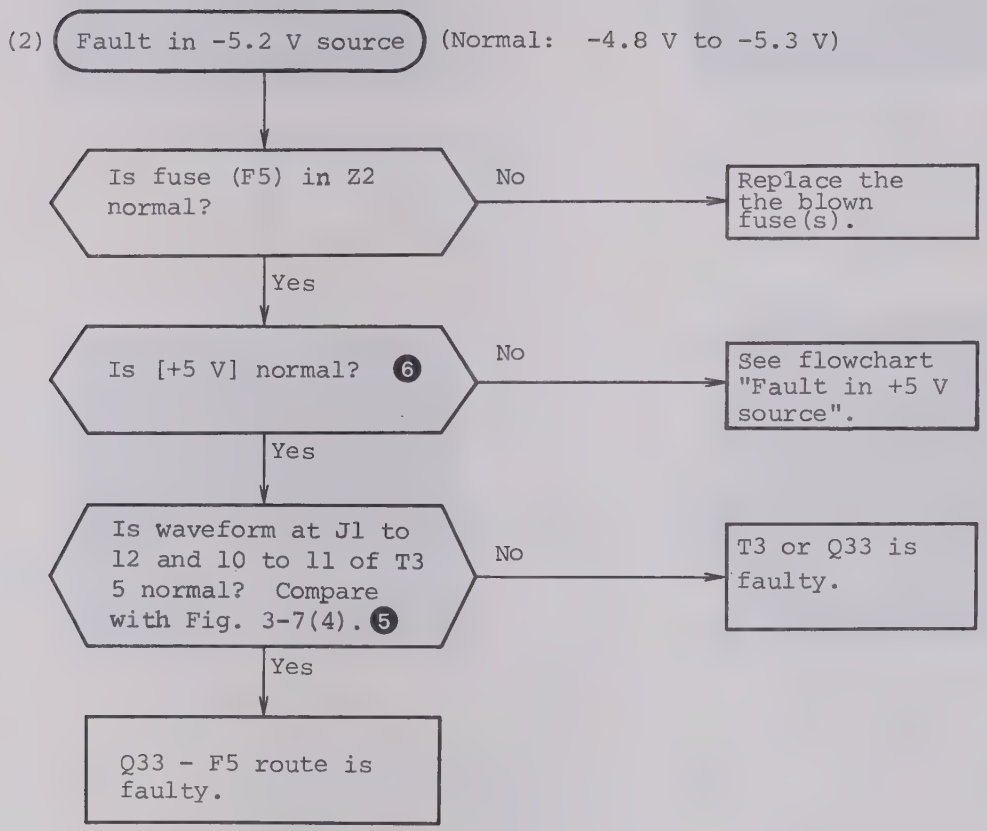

(2) Fault in -5.2 V source
(Normal: -4.8 V to -5.3 V)
Is fuse (F5) in Z2 normal?
No
Replace the the blown fuse(s).
Yes
Is [+5 V] normal? 6
No
See flowchart "Fault in +5 V source".
Yes
Is waveform at J1 to 12 and 10 to 11 of T3 5 normal? Compare with Fig. 3-7(4). 5
No
T3 or Q33 is faulty.
Yes
Q33 - F5 route is faulty.

Fig. 3-4 Regulated DC Power Supply Troubleshooting Flowchart (-5.2 V)

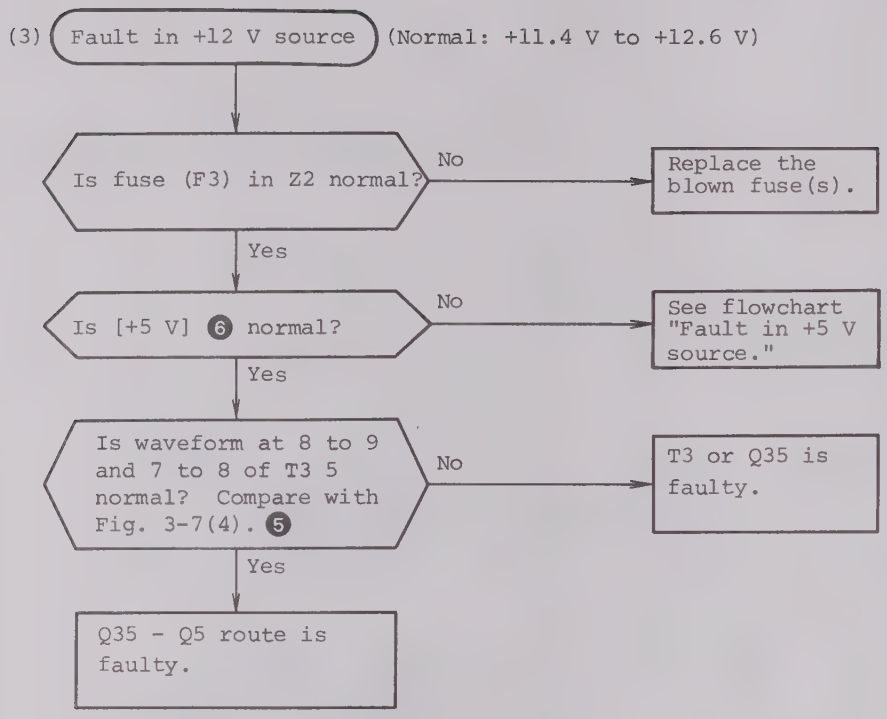

(3) Fault in +12 V source
(Normal: +11.4 V to +12.6 V)
Is fuse (F3) in Z2 normal?
No
Replace the blown fuse(s).
Yes
Is [+5 V] 6 normal?
No
See flowchart "Fault in +5 V source."
Yes
Is waveform at 8 to 9 and 7 to 8 of T3 5 normal? Compare with Fig. 3-7(4). 5
No
T3 or Q35 is faulty.
Yes
Q35 - Q5 route is faulty.

Fig. 3-5 Regulated DC Power Supply Troubleshooting Flowchart (+12V)

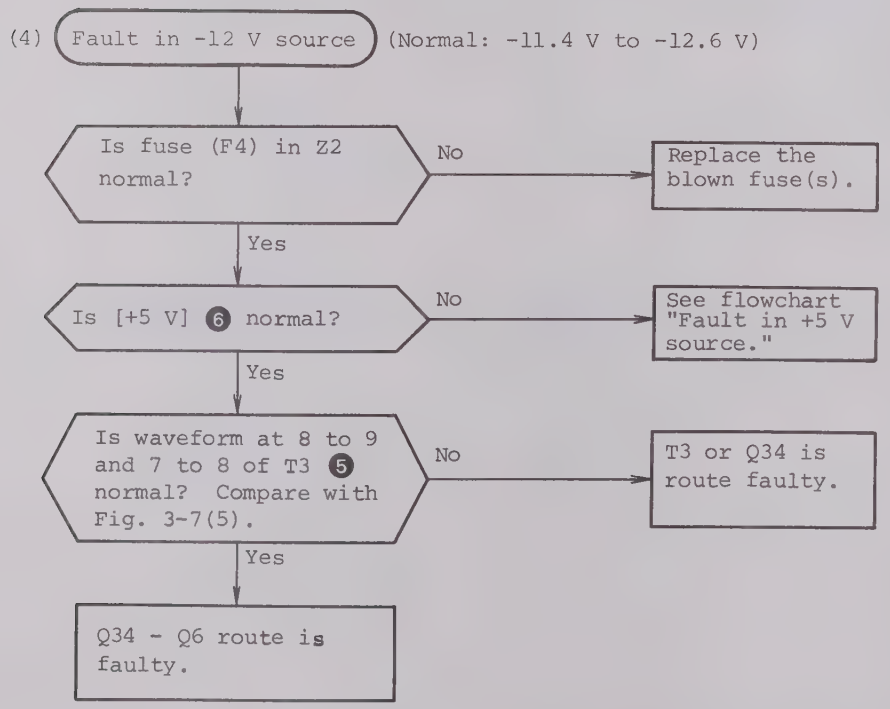
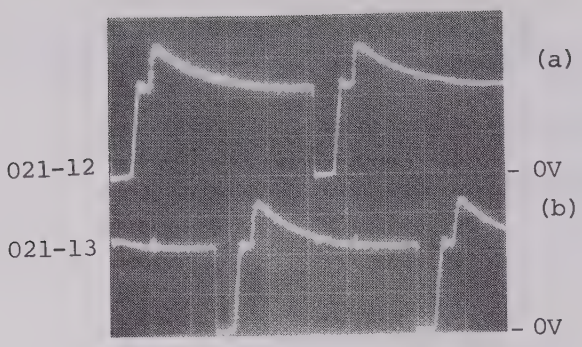
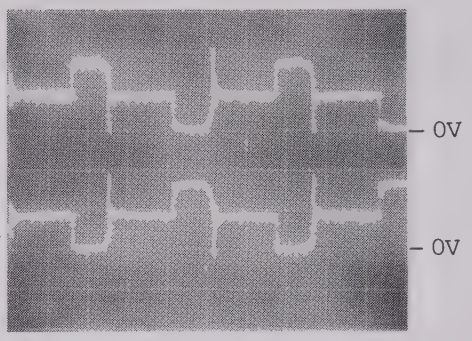

(4) Fault in -12 V source
(Normal: -11.4 V to -12.6 V)
Is fuse (F4) in Z2 normal?
No
Replace the blown fuse(s).
Yes
Is [+5 V] 6 normal?
No
See flowchart "Fault in +5 V source."
Yes
Is waveform at 8 to 9 and 7 to 8 of T3 5 normal? Compare with Fig. 3-7(5).
No
T3 or Q34 is route faulty.
Yes
Q34 - Q6 route is faulty.

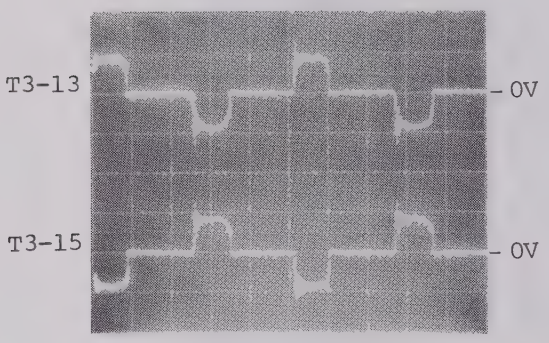
Fig. 3-6 Regulated DC Power Supply Troubleshooting Flowchart (-12 V)



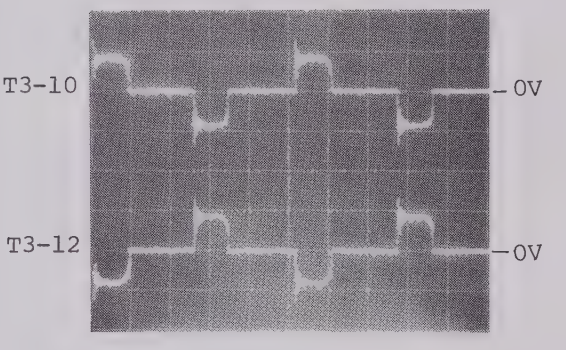
(1) 10 V/div, 5 μs/div



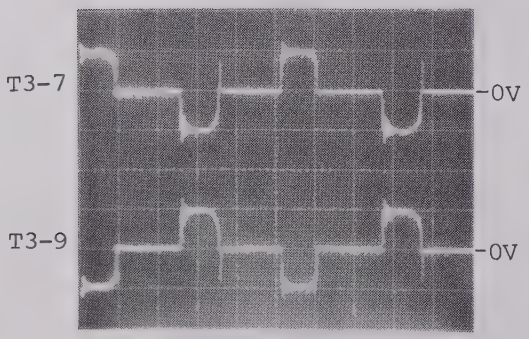
(2) 50 V/div, 5 μs/div



(3) 20 V/div, 5 μs/div



(4) 20 V/div, 5 μs/div



(5) 50 V/div, 5 μs/div

Fig. 3-7 Waveforms of Power Supply Circuit Main Parts

3.2.3 Front Panel LED or Key Switch Troubleshooting

Refer to
- 4 Power Supply Circuit (Z2): 43W30644 (3/5, 5/5)
- 6 Front Panel Circuit (Z4): 43W30646 (1/3 to 3/3)

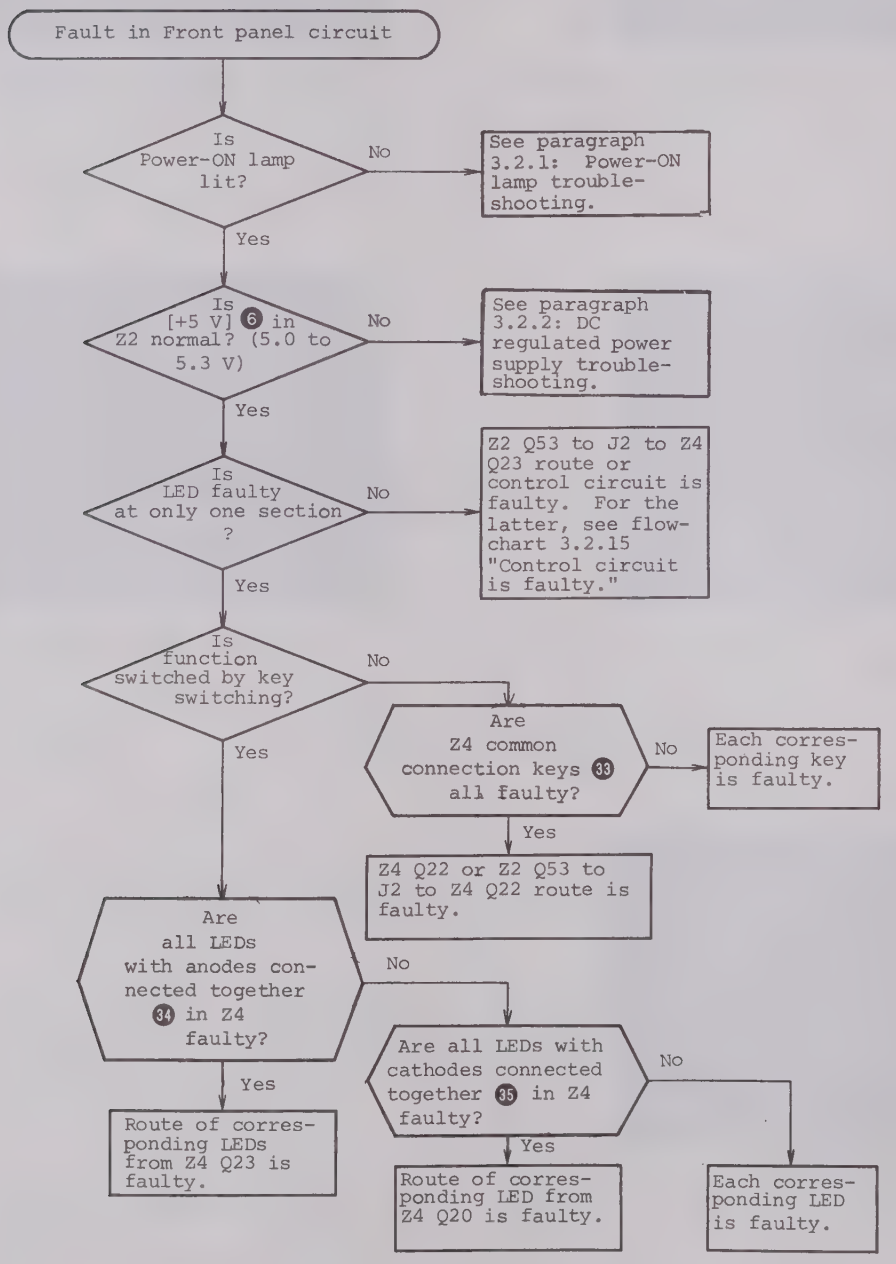

Fault in Front panel circuit
Is Power-ON lamp lit?
No
See paragraph 3.2.1: Power-ON lamp trouble-shooting.
Yes
Is [+5 V] 6 in Z2 normal? (5.0 to 5.3 V)
No
See paragraph 3.2.2: DC regulated power supply trouble-shooting.
Yes
Is LED faulty at only one section ?
No
Z2 Q53 to J2 to Z4 Q23 route or control circuit is faulty. For the latter, see flow-chart 3.2.15 "Control circuit is faulty."
Yes
Is function switched by key switching?
No
Are Z4 common connection keys 33 all faulty?
No
Each corres-ponding key is faulty.
Yes
Z4 Q22 or Z2 Q53 to J2 to Z4 Q22 route is faulty.
Yes
Are all LEDs with anodes con-nected together 34 in Z4 faulty?
No
Are all LEDs with cathodes connected together 35 in Z4 faulty?
No
Yes
Route of corres-ponding LEDs from Z4 Q23 is faulty.
Yes
Route of corres-ponding LED from Z4 Q20 is faulty.
Each corres-ponding LED is faulty.

Fig. 3-8 Front Panel LED or Key Switch Troubleshooting Flowchart

3.2.4 External Clock Operation Troubleshooting

Refer to

- 4 Power Supply Circuit (Z2): 43W30644 (4/5, 5/5)
- 5 Pattern Generator (Z3): 43W30645 (1/15, 14/15)
- 6 OPT 01 to 04 (Z5): 43W32137 (1/1)

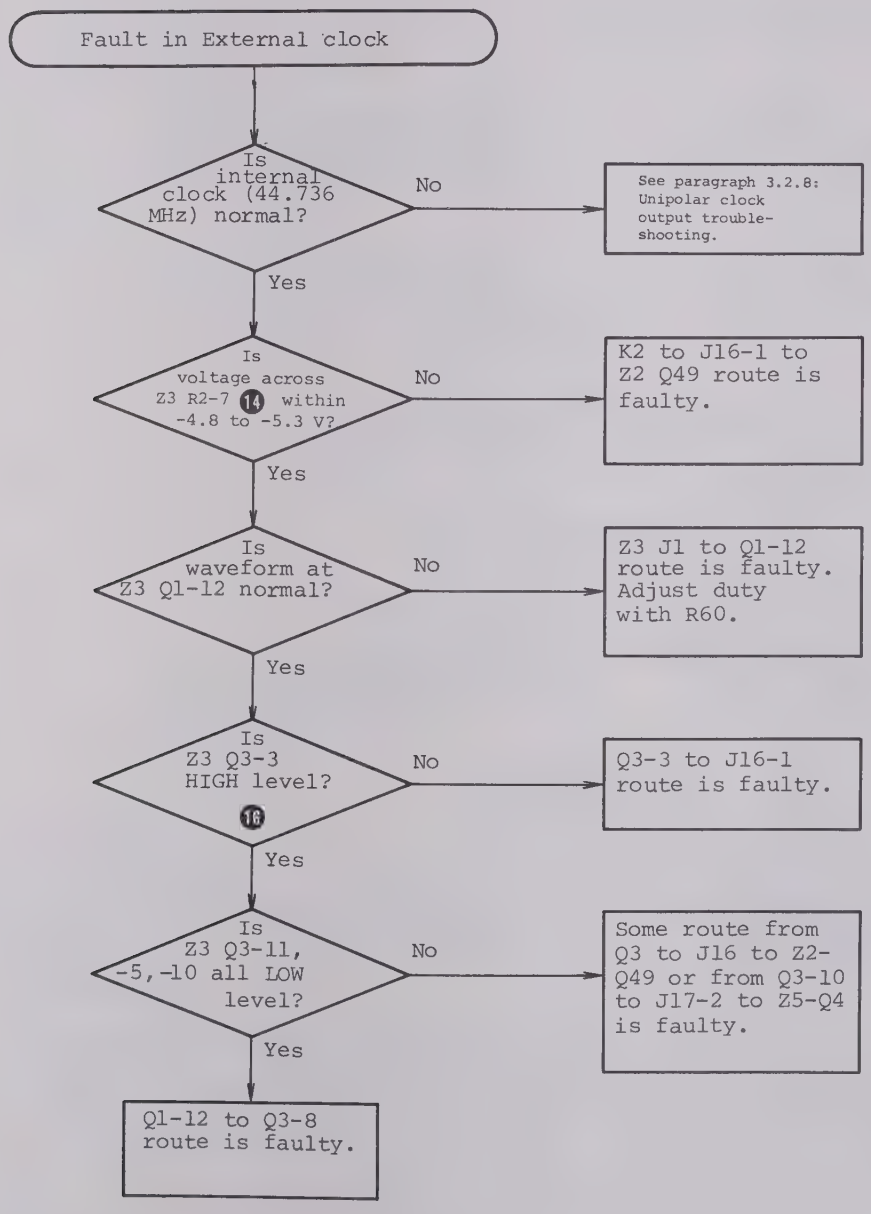

Fault in External clock
Is internal clock (44.736 MHz) normal?
No
See paragraph 3.2.8: Unipolar clock output trouble-shooting.
Yes
Is voltage across Z3 R2-7 14 within -4.8 to -5.3 V?
No
K2 to J16-1 to Z2 Q49 route is faulty.
Yes
Is waveform at Z3 Q1-12 normal?
No
Z3 J1 to Q1-12 route is faulty. Adjust duty with R60.
Yes
Is Z3 Q3-3 HIGH level? 16
No
Q3-3 to J16-1 route is faulty.
Yes
Is Z3 Q3-11, -5, -10 all LOW level?
No
Some route from Q3 to J16 to Z2-Q49 or from Q3-10 to J17-2 to Z5-Q4 is faulty.
Yes
Q1-12 to Q3-8 route is faulty.

Fig. 3-9 External Clock Operation Troubleshooting Flowchart

3.2.5 F1 to F5 Operation Troubleshooting

Refer to

- 4 Power Supply Circuit (Z9): 43W30644 (4/5, 5/5)
- 5 Pattern Generator (Z3): 43W30645 (1/15, 14/15)
- 7 OPT 01 to 04 (Z5): 43W32137 (1/1)

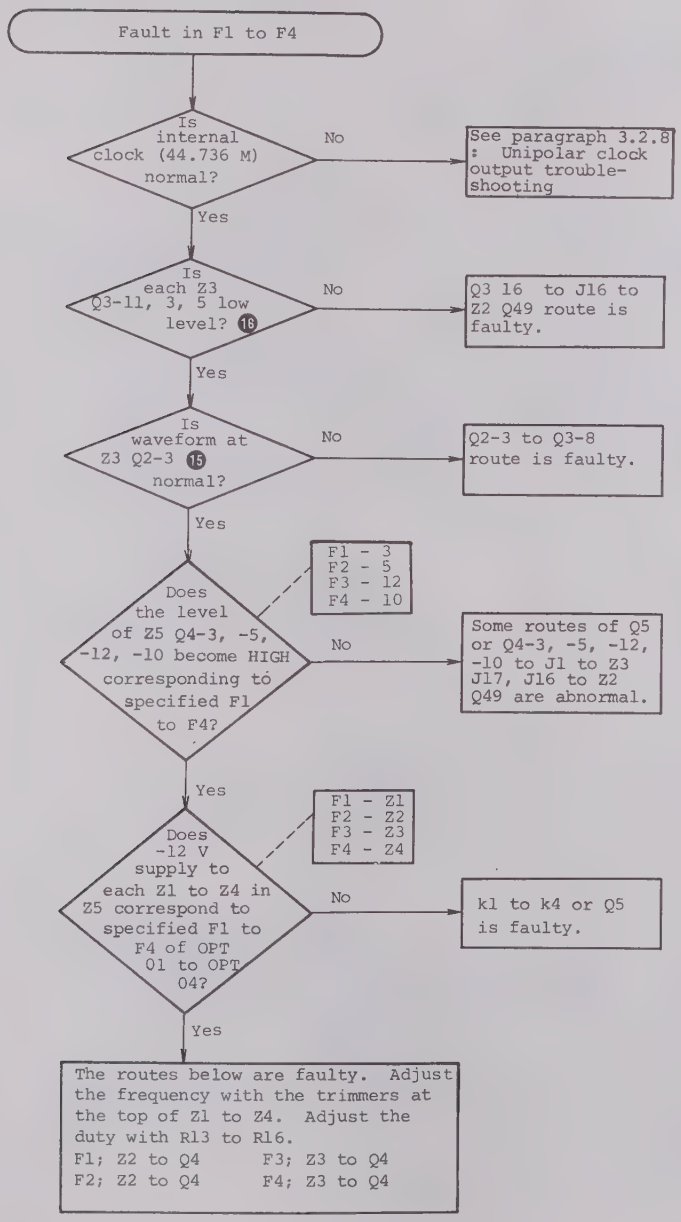

Fault in F1 to F4
Is internal clock (44.736 M) normal?
No
See paragraph 3.2.8 : Unipolar clock output trouble-shooting
Yes
Is each Z3 Q3-11, 3, 5 low level? 16
No
Q3 16 to J16 to Z2 Q49 route is faulty.
Yes
Is waveform at Z3 Q2-3 15 normal?
No
Q2-3 to Q3-8 route is faulty.
Yes
F1 - 3
F2 - 5
F3 - 12
F4 - 10
Does the level of Z5 Q4-3, -5, -12, -10 become HIGH corresponding to specified F1 to F4?
No
Some routes of Q5 or Q4-3, -5, -12, -10 to J1 to Z3 J17, J16 to Z2 Q49 are abnormal.
Yes
F1 - Z1
F2 - Z2
F3 - Z3
F4 - Z4
Does -12 V supply to each Z1 to Z4 in Z5 correspond to specified F1 to F4 of OPT 01 to OPT 04?
No
k1 to k4 or Q5 is faulty.
Yes
The routes below are faulty. Adjust the frequency with the trimmers at the top of Z1 to Z4. Adjust the duty with R13 to R16.
F1; Z2 to Q4
F2; Z2 to Q4
F3; Z3 to Q4
F4; Z3 to Q4

Fig. 3-10 F1 to F5 Operation Troubleshooting Flowchart

3.2.6 Jitter Modulation Troubleshooting

Refer to
- 4 Power Supply Circuit (Z2): 43W30644 (4/5, 5/5)
- 5 Pattern Generator (Z3): 43W30645 (13/15, 14/15)
- 6 Front Panel Circuit (Z4): 43W30646 (3/3)

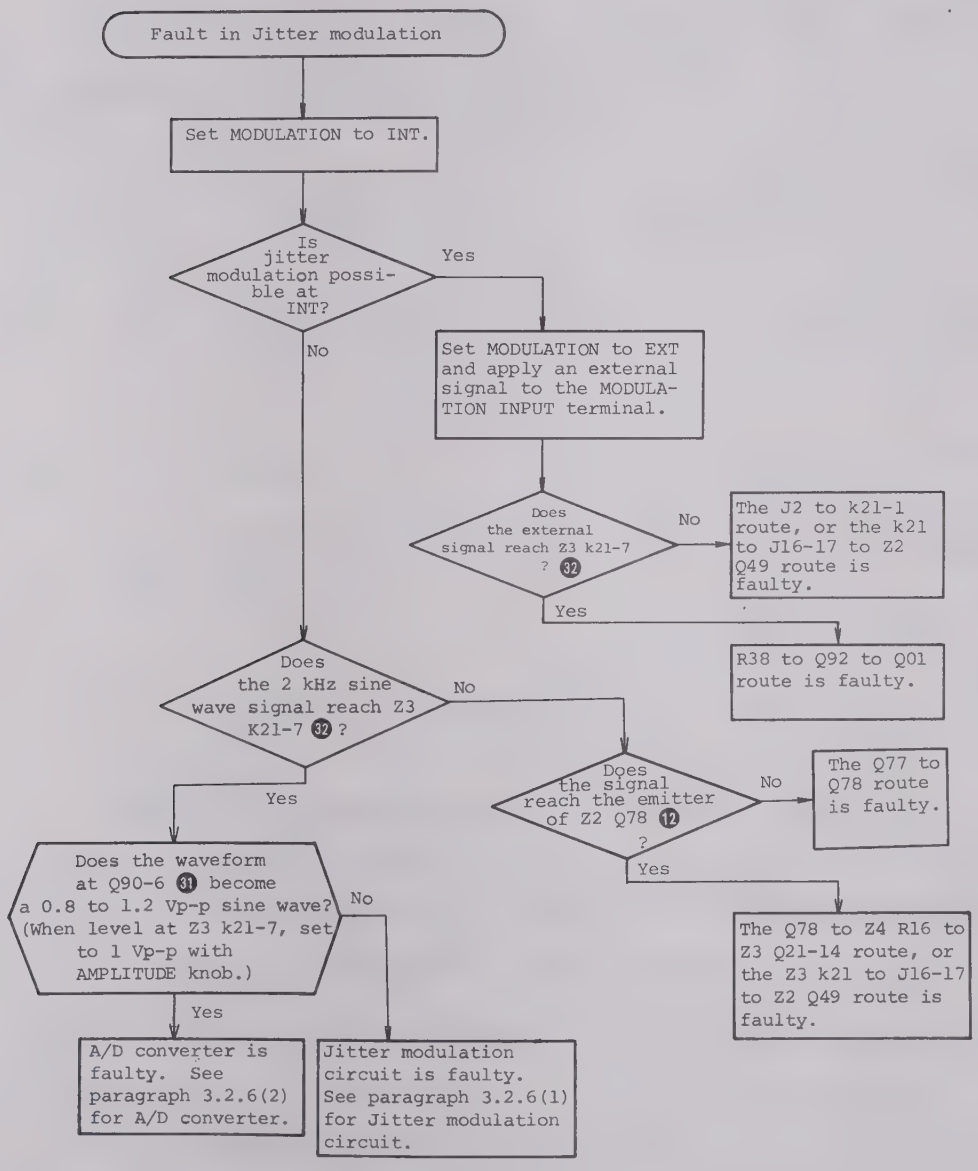

Fault in Jitter modulation
Set MODULATION to INT.
Is jitter modulation possible at INT?
Yes
No
Set MODULATION to EXT and apply an external signal to the MODULATION INPUT terminal.
Does the external signal reach Z3 k21-7 ? 32
No
The J2 to k21-1 route, or the k21 to J16-17 to Z2 Q49 route is faulty.
Yes
R38 to Q92 to Q01 route is faulty.
Does the 2 kHz sine wave signal reach Z3 K21-7 32 ?
No
Yes
Does the signal reach the emitter of Z2 Q78 12 ?
No
The Q77 to Q78 route is faulty.
Yes
The Q78 to Z4 R16 to Z3 Q21-14 route, or the Z3 k21 to J16-17 to Z2 Q49 route is faulty.
Does the waveform at Q90-6 31 become a 0.8 to 1.2 Vp-p sine wave? (When level at Z3 k21-7, set to 1 Vp-p with AMPLITUDE knob.)
No
Yes
A/D converter is faulty. See paragraph 3.2.6(2) for A/D converter.
Jitter modulation circuit is faulty. See paragraph 3.2.6(1) for Jitter modulation circuit.

Fig. 3-11 Jitter Modulation Troubleshooting Flowchart

(1) Jitter Modulation Circuit

The main section of the jitter modulation circuit is shown in Fig. 3-12.

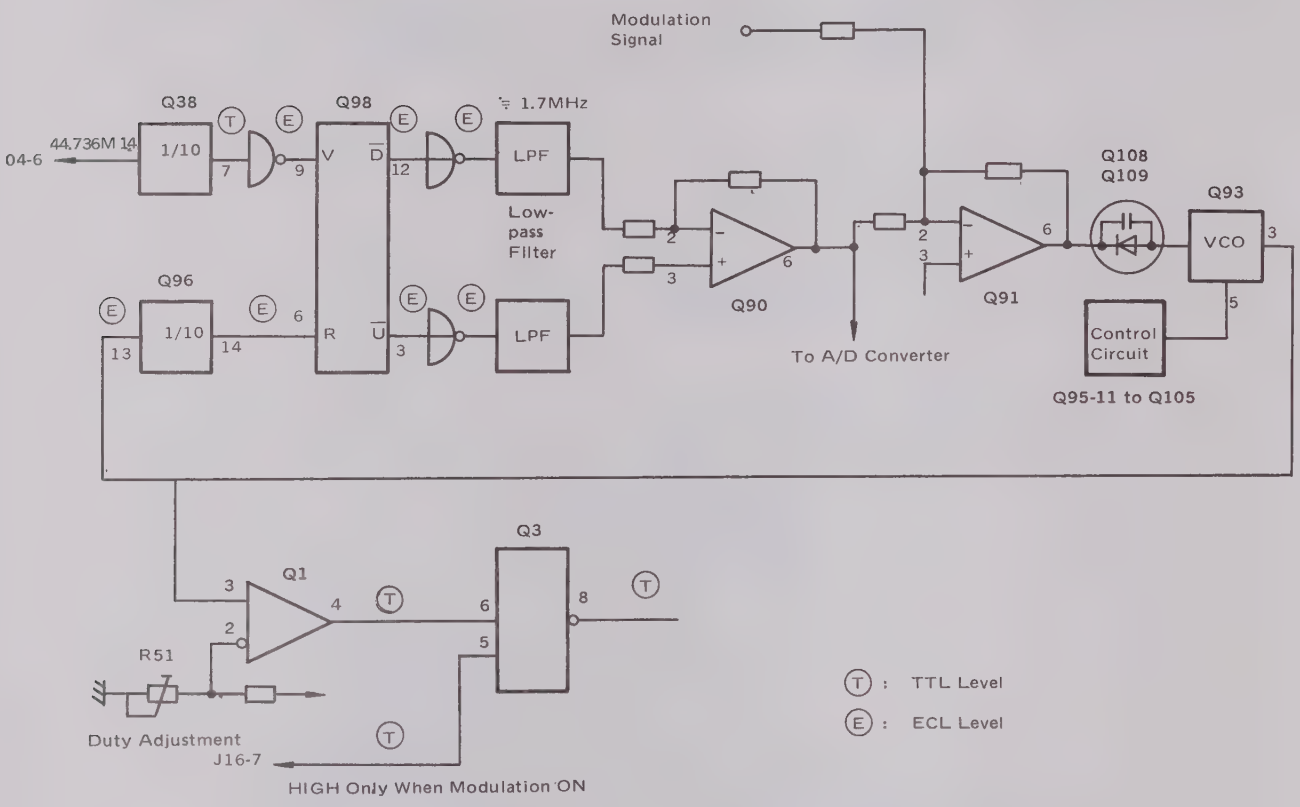


Fig. 3-12 Jitter Modulation Circuit

Jitter modulation is performed as follows.

The voltage applied to Q108 and Q109 is changed by the internal or external modulation signal. Q108 and Q109 are voltage variable capacitance diodes. Their capacitance is changed by this voltage change. As a result, the frequency of the VCO changes, and jitter modulation is applied. The Q38, Q96 to Q90 route is the circuit for locking the BCO center frequency at 44.736 MHz. When the modulation signal is not applied, the VCO output is locked at 44.736 MHz through the following processes.

VCO frequency becomes higher than 44.736 MHz. → Mark rate of Q98 $\bar{D}$ becomes lower than the $\bar{V}$ output. → Q90 output level becomes large. → Q91 output level becomes small. → Voltage applied to Q108 and Q109 becomes small. → VCO frequency becomes lower.

Therefore, when the jitter modulation circuit is abnormal, check if each circuit is operating in accordance with the above-mentioned flow. If a point which does not conform to this flow is found, that part is faulty.

The control circuit is for stopping the oscillation of the VCO when MODULATION is OFF. The Q93-5 L level is -4.8 V or less when MODULATION is OFF, and -4 V or more when MODULATION is ON. R51 is used to adjust the duty of the jittered clock.

(2) A/D Converter

The main section of the A/D converter is shown in Fig. 3-13.

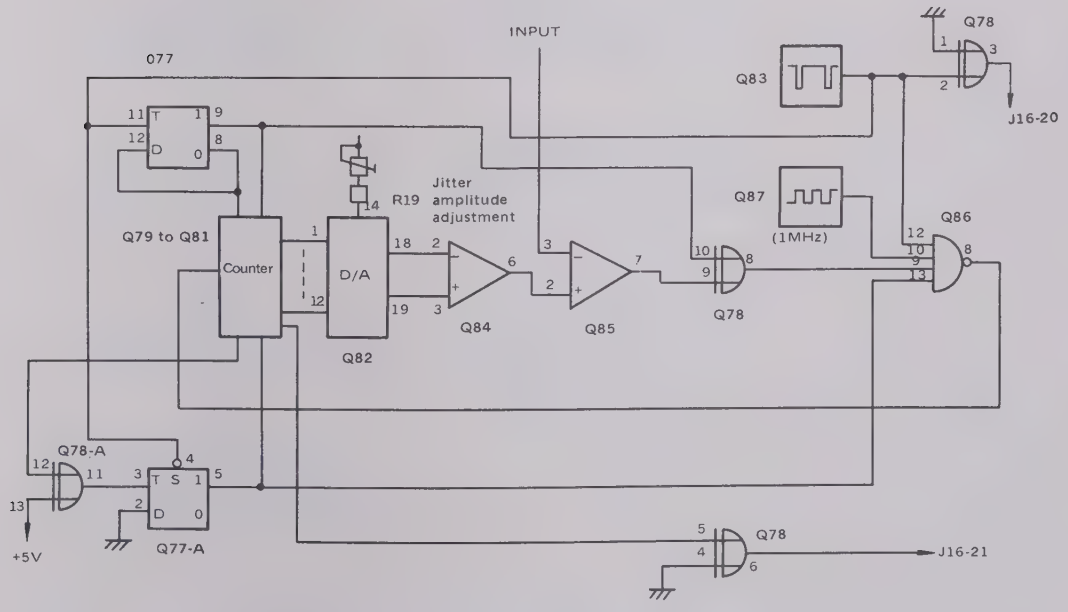


Fig. 3-13 A/D Converter

A gate pulse is generated at Q83. It lasts approximately 700 ms. The input signal is compared to the D/A output by Q85. If there is a difference between the two signals, the pulse of Q87 is applied to the counter circuit (Q79 to Q81). If the level of the input signal and D/A output is the same, the pulse from Q87 is inhibited by Q86.

The number of pulses from the start of measurement until both levels match is counted by CLK2 of Q57 in Z2 (power supply circuit) through J16-21. The output of Q78-3 is used as the interrupt signal at the end of measurement in Z2. Q78-A and Q77-A form the circuit for stopping counting by the counter when the counter overflows. A/D circuit gain adjustment, that is, jitter amplitude adjustment, is performed with R19.

3.2.7 DS-3 Output Waveform Troubleshooting

Refer to
- [4] Power Supply Circuit (Z2): 43W30644 (4/5, 5/5)
- [5] Pattern Generator (Z3): 43W30645 (2/15, 5/15, 6/15, 5/15 to 12/15)

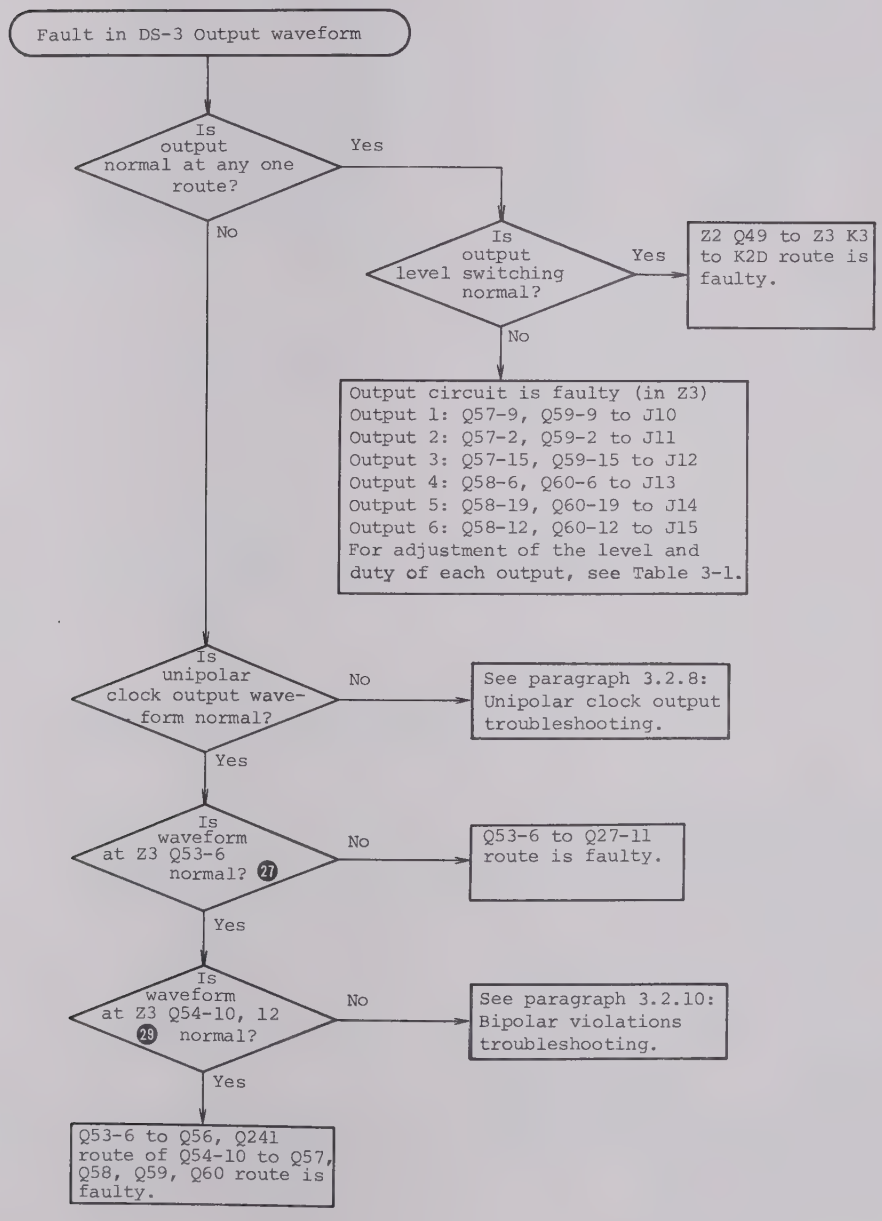

Fault in DS-3 Output waveform
Is output normal at any one route?
Yes
No
Is output level switching normal?
Yes
Z2 Q49 to Z3 K3 to K2D route is faulty.
No
Output circuit is faulty (in Z3)
Output 1: Q57-9, Q59-9 to J10
Output 2: Q57-2, Q59-2 to J11
Output 3: Q57-15, Q59-15 to J12
Output 4: Q58-6, Q60-6 to J13
Output 5: Q58-19, Q60-19 to J14
Output 6: Q58-12, Q60-12 to J15
For adjustment of the level and duty of each output, see Table 3-1.
Is unipolar clock output waveform normal?
No
See paragraph 3.2.8: Unipolar clock output troubleshooting.
Yes
Is waveform at Z3 Q53-6 normal? 27
No
Q53-6 to Q27-11 route is faulty.
Yes
Is waveform at Z3 Q54-10, 12 29 normal?
No
See paragraph 3.2.10: Bipolar violations troubleshooting.
Yes
Q53-6 to Q56, Q241 route of Q54-10 to Q57, Q58, Q59, Q60 route is faulty.

Fig. 3-14 DS-3 Output Waveform Troubleshooting Flowchart

Table 3-1 DS-3 Output Level and Duty Adjustment

Output	Level		Duty	
	+ pulse	- pulse	+ pulse	- pulse
1	R130	R129	R69	R445
2	R128	R127	R69	R445
3	R126	R125	R69	R445
4	R124	R123	R442	R448
5	R122	R121	R442	R448
6	R120	R119	R442	R448

3.2.8 Unipolar Clock Output (Frequency, Waveform) Troubleshooting

Refer to
- 4 Power Supply Circuit (Z2): 43W30644 (4/5, 5/5)
- 5 Refer to Pattern Generator (Z3): 43W30645 (2/15, 3/15, 7/15, 8/15, 14/15)
- 6 OPT 01 to 04 (Z5): 43W32137 (1/1)

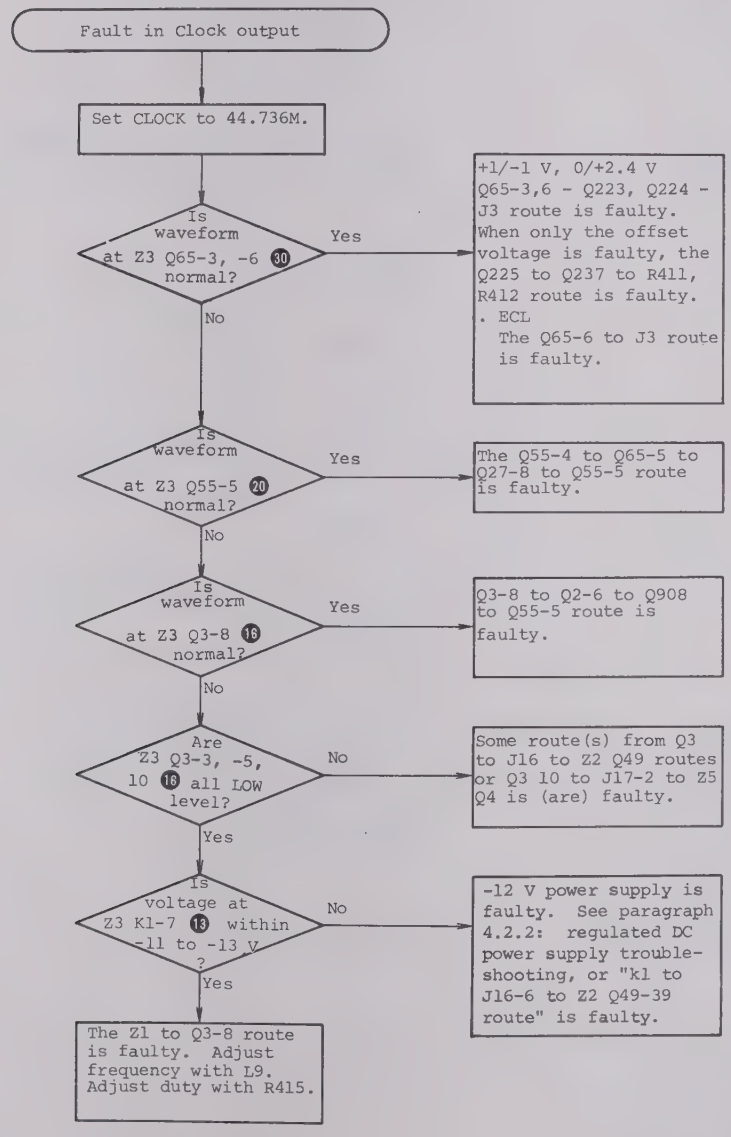

Fault in Clock output
Set CLOCK to 44.736M.
Is waveform at Z3 Q65-3, -6 (30) normal?
Yes
+1/-1 V, 0/+2.4 V Q65-3,6 - Q223, Q224 - J3 route is faulty. When only the offset voltage is faulty, the Q225 to Q237 to R411, R412 route is faulty.
. ECL
The Q65-6 to J3 route is faulty.
No
Is waveform at Z3 Q55-5 (20) normal?
Yes
The Q55-4 to Q65-5 to Q27-8 to Q55-5 route is faulty.
No
Is waveform at Z3 Q3-8 (16) normal?
Yes
Q3-8 to Q2-6 to Q908 to Q55-5 route is faulty.
No
Are Z3 Q3-3, -5, 10 (16) all LOW level?
No
Some route(s) from Q3 to J16 to Z2 Q49 routes or Q3 10 to J17-2 to Z5 Q4 is (are) faulty.
Yes
Is voltage at Z3 K1-7 (13) within -11 to -13 V ?
No
-12 V power supply is faulty. See paragraph 4.2.2: regulated DC power supply trouble-shooting, or "k1 to J16-6 to Z2 Q49-39 route" is faulty.
Yes
The Z1 to Q3-8 route is faulty. Adjust frequency with L9. Adjust duty with R415.

Fig. 3-15 Unipolar Clock Output (Frequency, Waveform) Troubleshooting Flowchart

3.2.9 Unipolar Data Output Waveform Troubleshooting

Refer to [5] Pattern Generator (Z3): 43W30645 (3/15, 4/15, 7/15, 8/15)

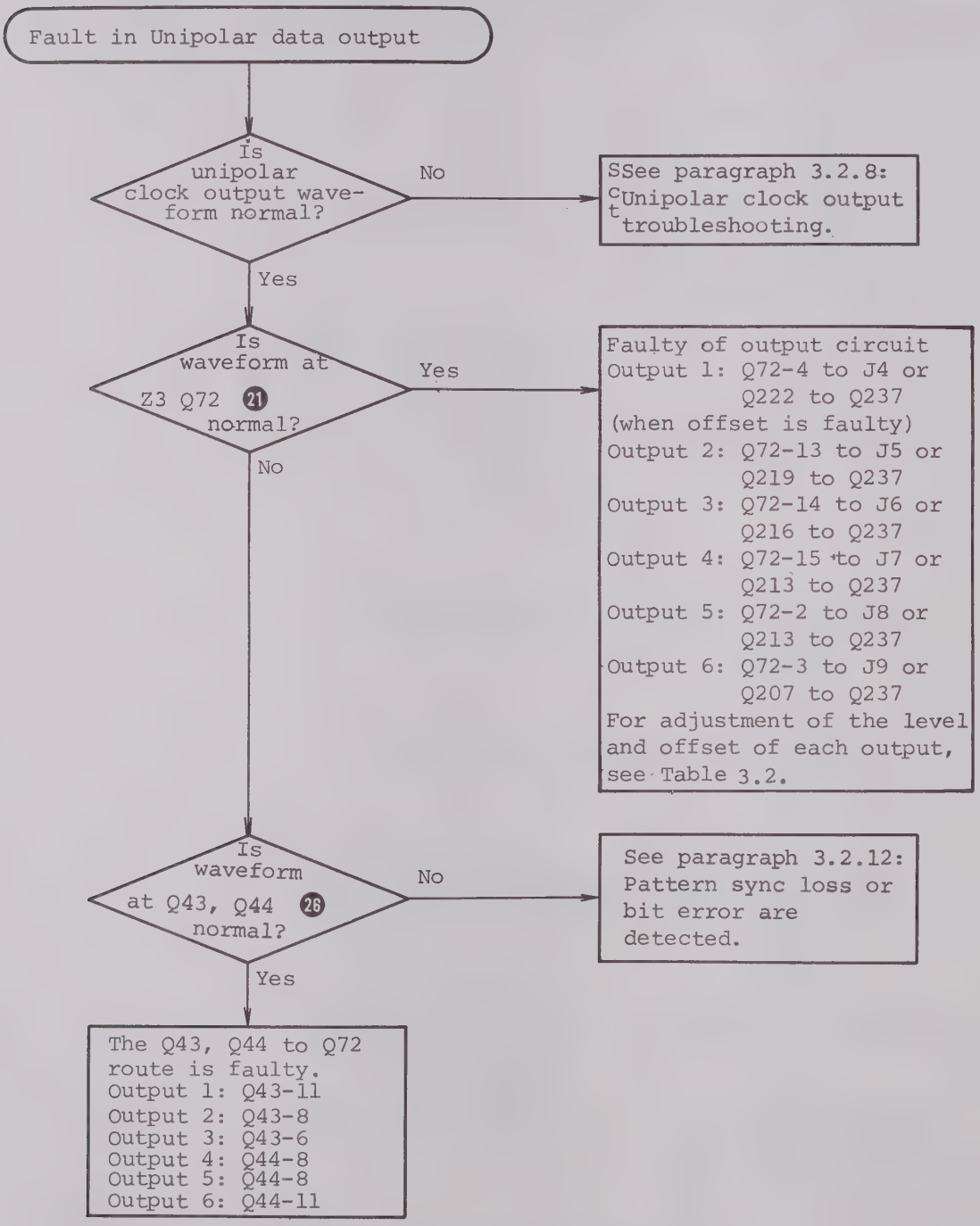

Fault in Unipolar data output
Is unipolar clock output waveform normal?
No
SSee paragraph 3.2.8: Unipolar clock output troubleshooting.
Yes
Is waveform at Z3 Q72 21 normal?
Yes
Faulty of output circuit
Output 1: Q72-4 to J4 or Q222 to Q237
(when offset is faulty)
Output 2: Q72-13 to J5 or Q219 to Q237
Output 3: Q72-14 to J6 or Q216 to Q237
Output 4: Q72-15 to J7 or Q213 to Q237
Output 5: Q72-2 to J8 or Q213 to Q237
Output 6: Q72-3 to J9 or Q207 to Q237
For adjustment of the level and offset of each output, see Table 3.2.
No
Is waveform at Q43, Q44 26 normal?
No
See paragraph 3.2.12: Pattern sync loss or bit error are detected.
Yes
The Q43, Q44 to Q72 route is faulty.
Output 1: Q43-11
Output 2: Q43-8
Output 3: Q43-6
Output 4: Q44-8
Output 5: Q44-8
Output 6: Q44-11

Fig. 3-16 Unipolar Data Output Waveform Troubleshooting Flowchart

Table 3-2 Unipolar Data Output Level and Offset Adjustment

Output	Level		Offset	
	+1/-1 V	0/+2.4 V	+1/-1 V	0/+2.4 V
1	R280		R411	R412
2	R278			
3	R276			
4	R274			
5	R272			
6	R270			

3.2.10 BSZ3 Converter Troubleshooting

Refer to [5] Pattern Generator (Z3) 43W30645 (2/15, 5/15)

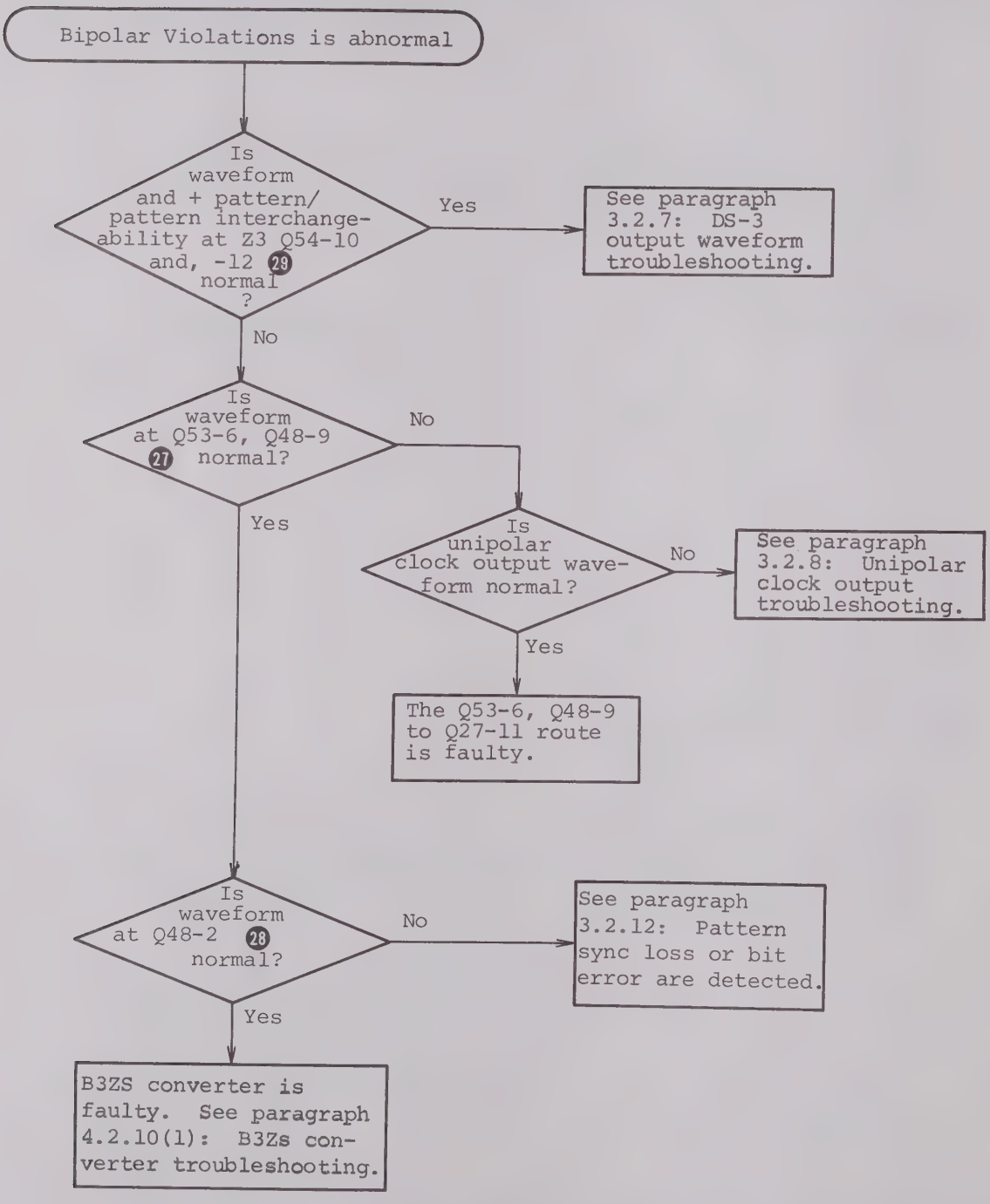

Bipolar Violations is abnormal
Is waveform and + pattern/ pattern interchange-ability at Z3 Q54-10 and, -12 29 normal ?
Yes
See paragraph 3.2.7: DS-3 output waveform troubleshooting.
No
Is waveform at Q53-6, Q48-9 27 normal?
No
Yes
Is unipolar clock output wave-form normal?
No
See paragraph 3.2.8: Unipolar clock output troubleshooting.
Yes
The Q53-6, Q48-9 to Q27-11 route is faulty.
Is waveform at Q48-2 28 normal?
No
See paragraph 3.2.12: Pattern sync loss or bit error are detected.
Yes
B3ZS converter is faulty. See paragraph 4.2.10(1): B3Zs con-verter troubleshooting.

Fig. 3-17 BSZ3 Converter Troubleshooting Flowchart

The B3ZS conversion rules are shown below. (CCITT Rec. G.703)

The B3ZS bipolar converter with three-zero substitution codes is a modified bipolar pulse format. Logical 1 bits are 50 per cent duty cycle and are generally alternately positive and negative with respect to the logical 0 level. Exceptions are cases where three logical 0s appear together in the bit-stream. In the B3ZS format, each block of three consecutive zeros is removed and replaced by BOV or OOV, where B represents a pulse conforming with the bipolar rule and V represents a pulse violating the bipolar rule. The choice of BOV or OOV is made so that there is an odd number of B pulses between consecutive V pulses.

The main section of the B3ZS converter (except the clock) is shown in Fig. 3-18.

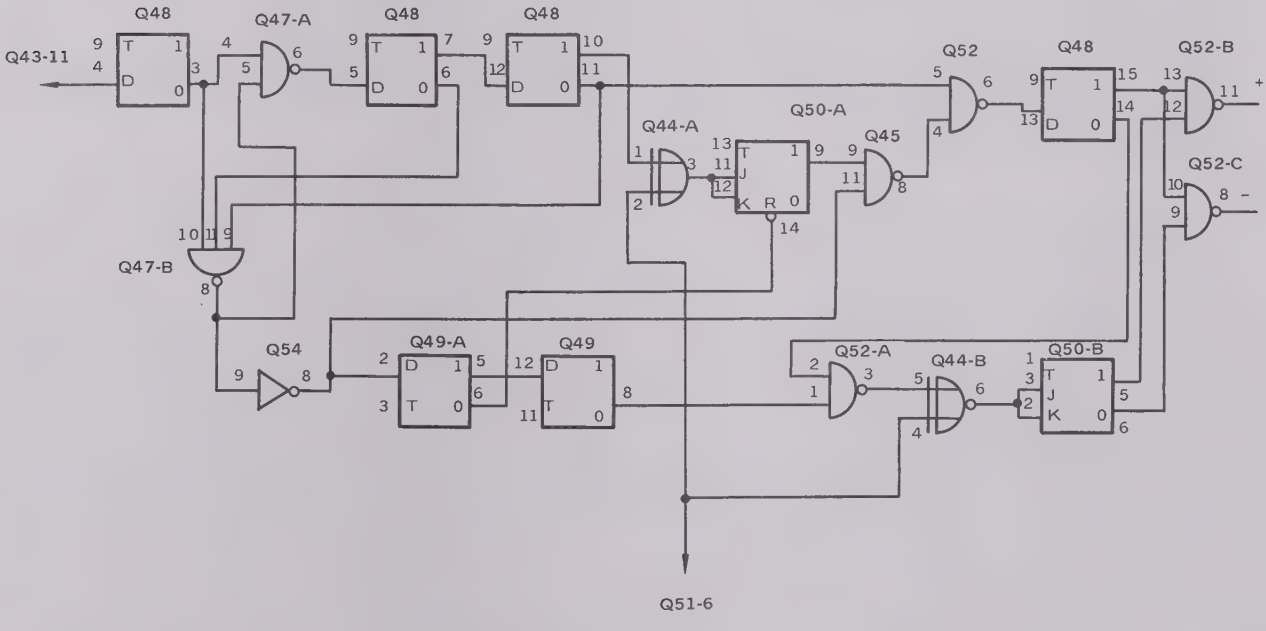


Fig. 3-18 B3ZS Converter

In the figure above, Q44-A and Q44-B are the circuits for bipolar violation addition. Normally, Q44-2 and Q44-4 are LOW level. Q47-B is the circuit for detecting a three consecutive bit "0" pattern from Q47-A is the circuit for converting the third "0" of the three to "1" each time the previously described pattern is detected. This "1" becomes the V bit.

50-Z, Q45, and Q49-A are the circuits which judge whether a "B" bit is added or not.

The output of Q50-A is reset (by Q49-6) at each "V" bit and is inverted each time a "1" pattern is input. If the number of "1" patterns up to input of the next three consecutive "0" patterns is an even number, the Q50-A output level remains LOW. If it is an odd number, the Q50-A output level becomes HIGH. When the Q50-A output level is HIGH, a "B" bit is added. The Q49-A to Q50-A output route is the circuit for inhibiting the "V" bit from the pattern to generate a bipolar violation at the "V" bit.

The pattern is divided into a + pattern/- pattern by Q50-B, Q52-B, and Q52-C.

3.2.11 Frame Signal Generator Troubleshooting

Refer to [5] Pattern Generator (Z3) 43W30645 (2/15, 4/15)

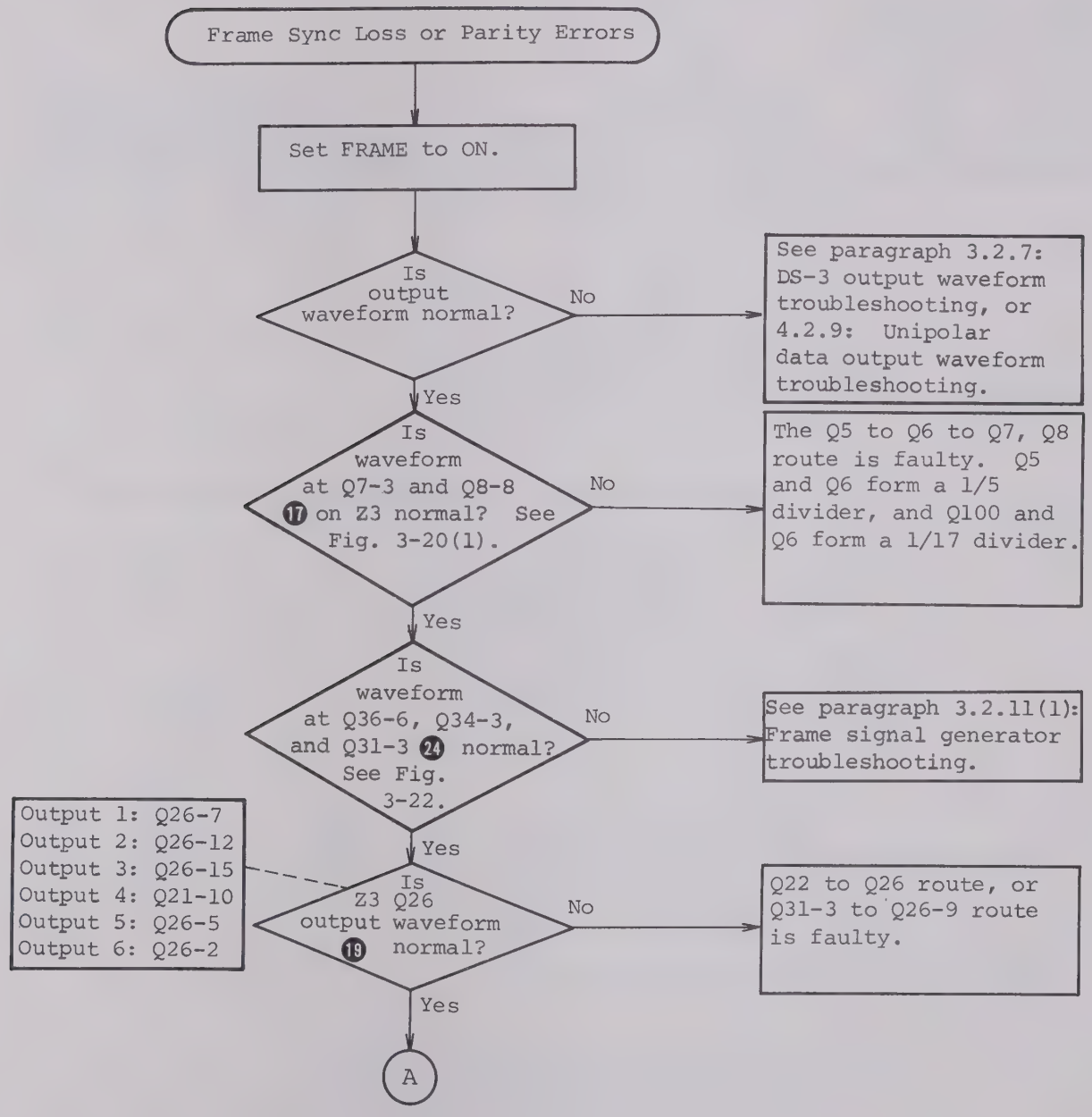

Frame Sync Loss or Parity Errors
Set FRAME to ON.
Is output waveform normal?
No
See paragraph 3.2.7: DS-3 output waveform troubleshooting, or 4.2.9: Unipolar data output waveform troubleshooting.
Yes
Is waveform at Q7-3 and Q8-8 ⑰ on Z3 normal? See Fig. 3-20(1).
No
The Q5 to Q6 to Q7, Q8 route is faulty. Q5 and Q6 form a 1/5 divider, and Q100 and Q6 form a 1/17 divider.
Yes
Is waveform at Q36-6, Q34-3, and Q31-3 ㉔ normal? See Fig. 3-22.
No
See paragraph 3.2.11(1): Frame signal generator troubleshooting.
Yes
Output 1: Q26-7
Output 2: Q26-12
Output 3: Q26-15
Output 4: Q21-10
Output 5: Q26-5
Output 6: Q26-2
Is Z3 Q26 output waveform ⑲ normal?
No
Q22 to Q26 route, or Q31-3 to Q26-9 route is faulty.
Yes
A

Fig. 3-19 Frame Signal Generator Troubleshooting Flowchart

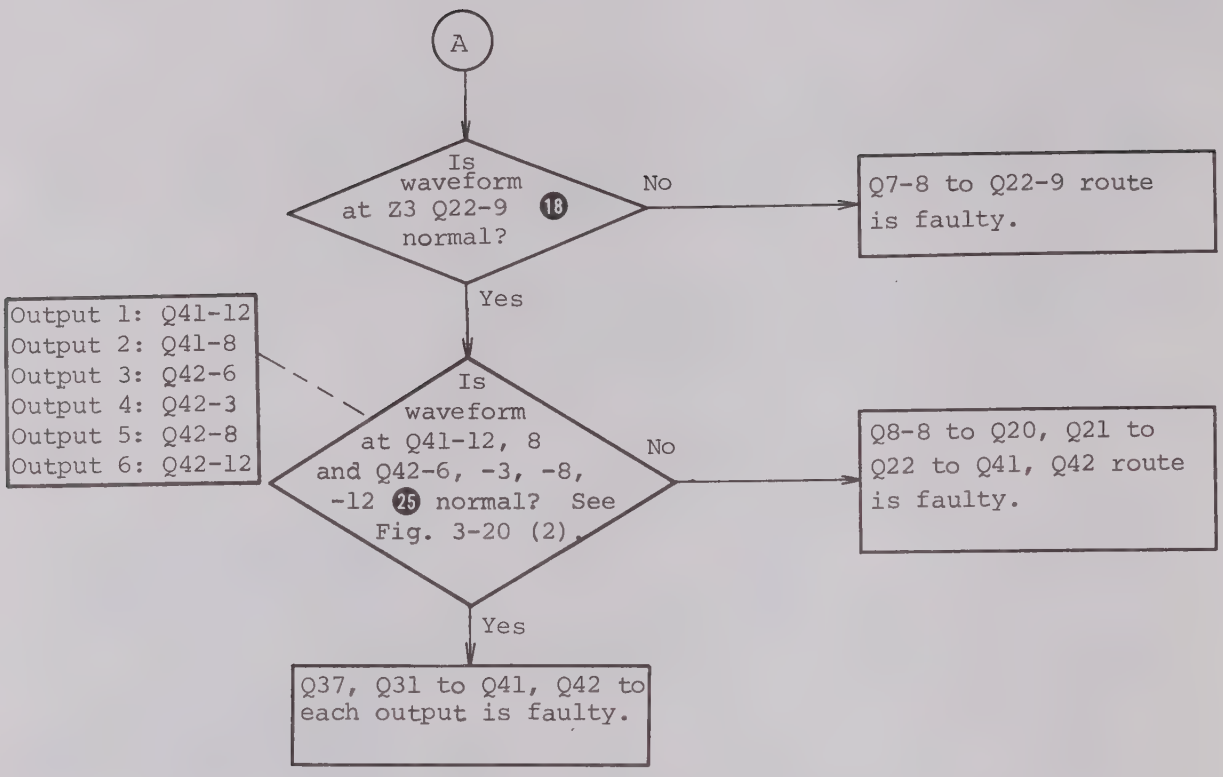
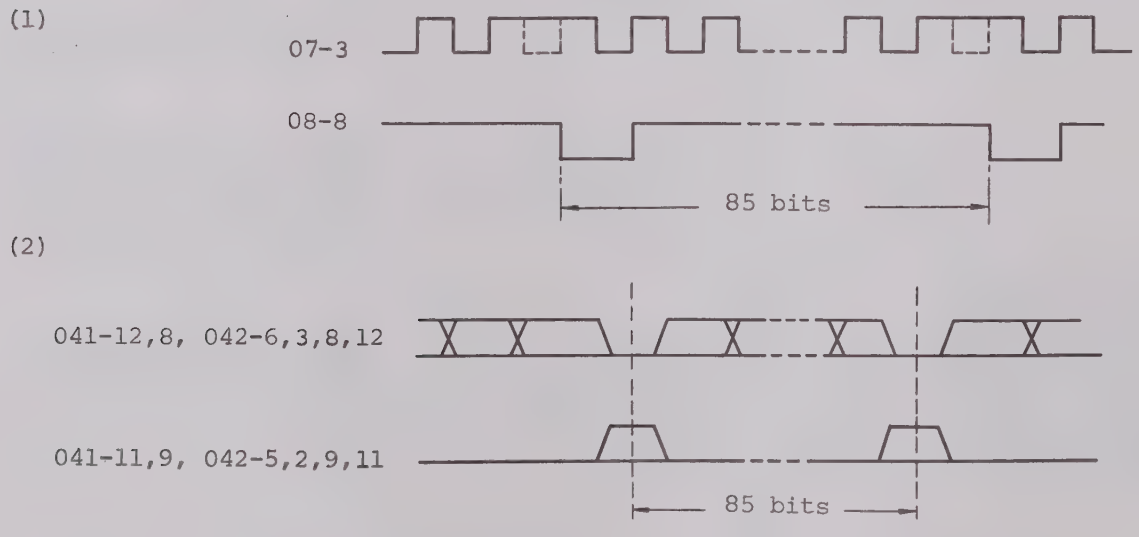

A
Is waveform at Z3 Q22-9 (18) normal?
No
Q7-8 to Q22-9 route is faulty.
Yes
Output 1: Q41-12
Output 2: Q41-8
Output 3: Q42-6
Output 4: Q42-3
Output 5: Q42-8
Output 6: Q42-12
Is waveform at Q41-12, 8 and Q42-6, -3, -8, -12 (25) normal? See Fig. 3-20 (2).
No
Q8-8 to Q20, Q21 to Q22 to Q41, Q42 route is faulty.
Yes
Q37, Q31 to Q41, Q42 to each output is faulty.

Fig. 3-19 (Cont.) Control Circuit Troubleshooting Flow Chart



(Multiframe sync output is used for the oscilloscope trigger.)

Fig. 3-20 Output Waveforms

The main part of the frame signal generator is shown in Fig. 3-21. The timing chart of the main part is shown in Fig. 3-22.

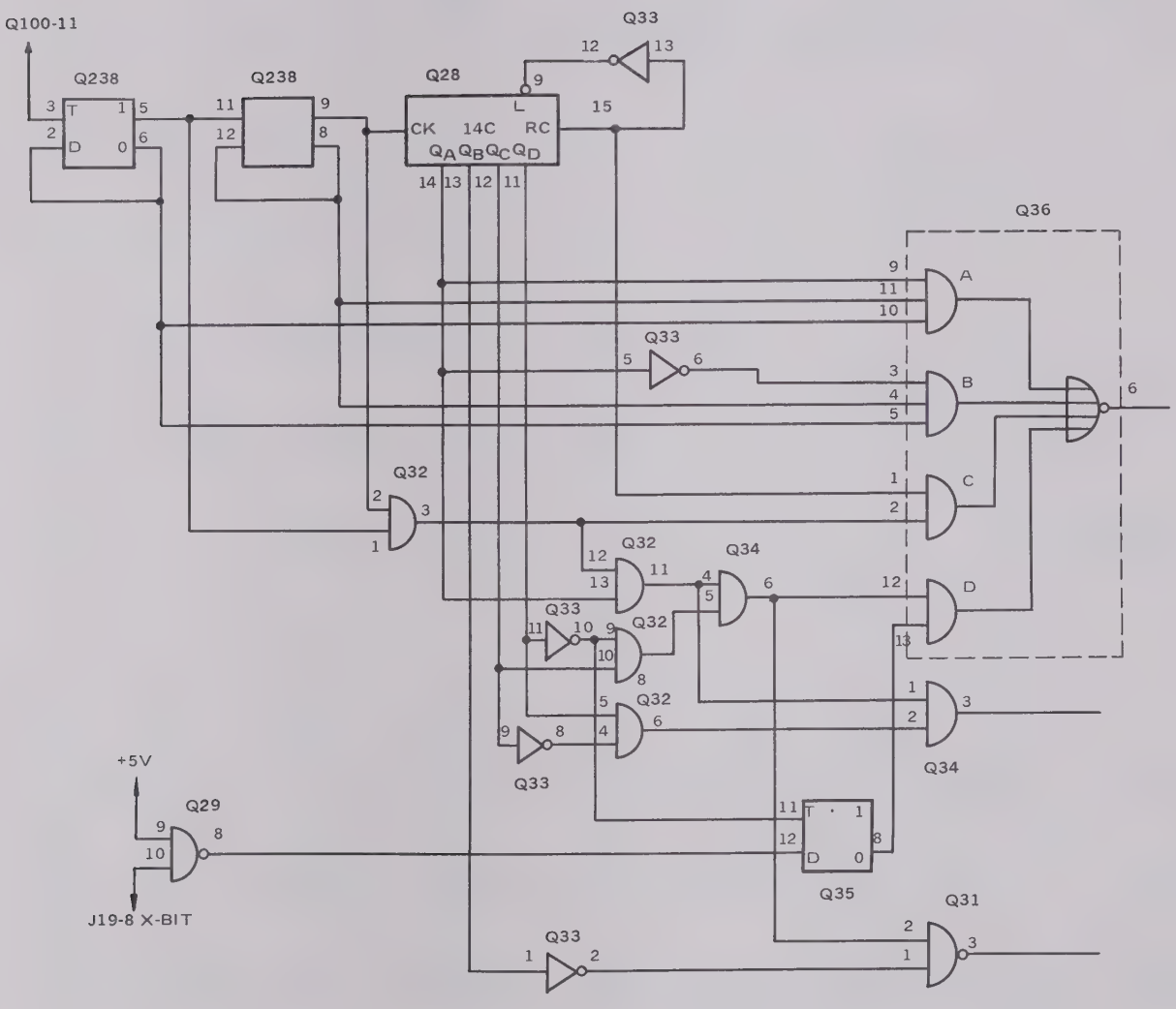


Fig. 3-21 Frame Signal Generator

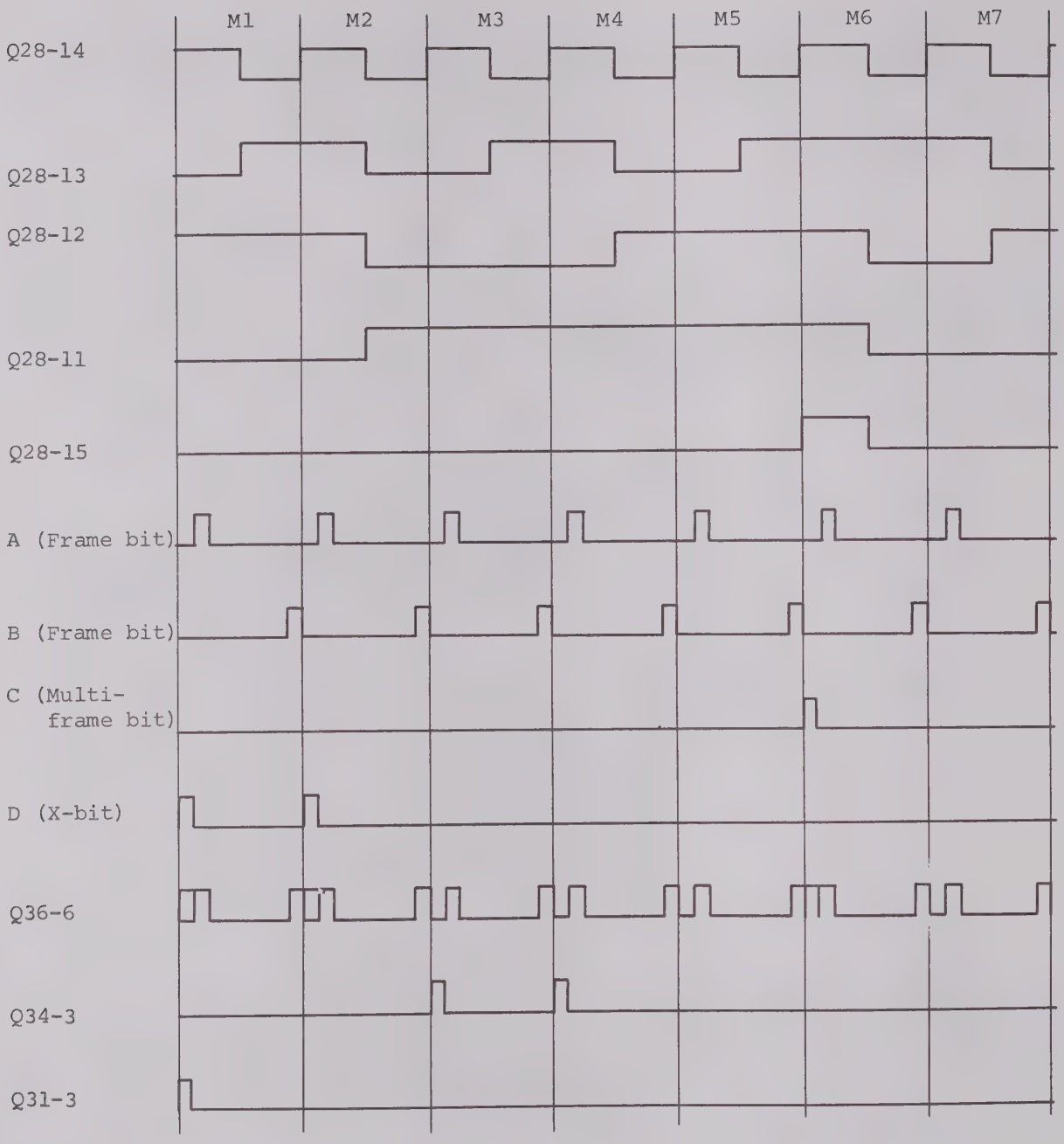


Fig. 3-22 Frame Signal Generator Timing Chart

Since A to D are inside of an IC, their waveforms cannot be observed. A and B each generate a frame bits (1001) "1". C generates the multiframe bits (010) "1". D generates the X-bit at both Q29 and Q35. Q34-3 is pulses for generating the parity bit. Q31-3 is the pulse for reading the parity (Q22 to Q26 in Z3) calculated from the output pattern.

3.2.12 Pattern Generator Troubleshooting

Refer to [5] Pattern Generator (Z3) 43W30645 (2/15)

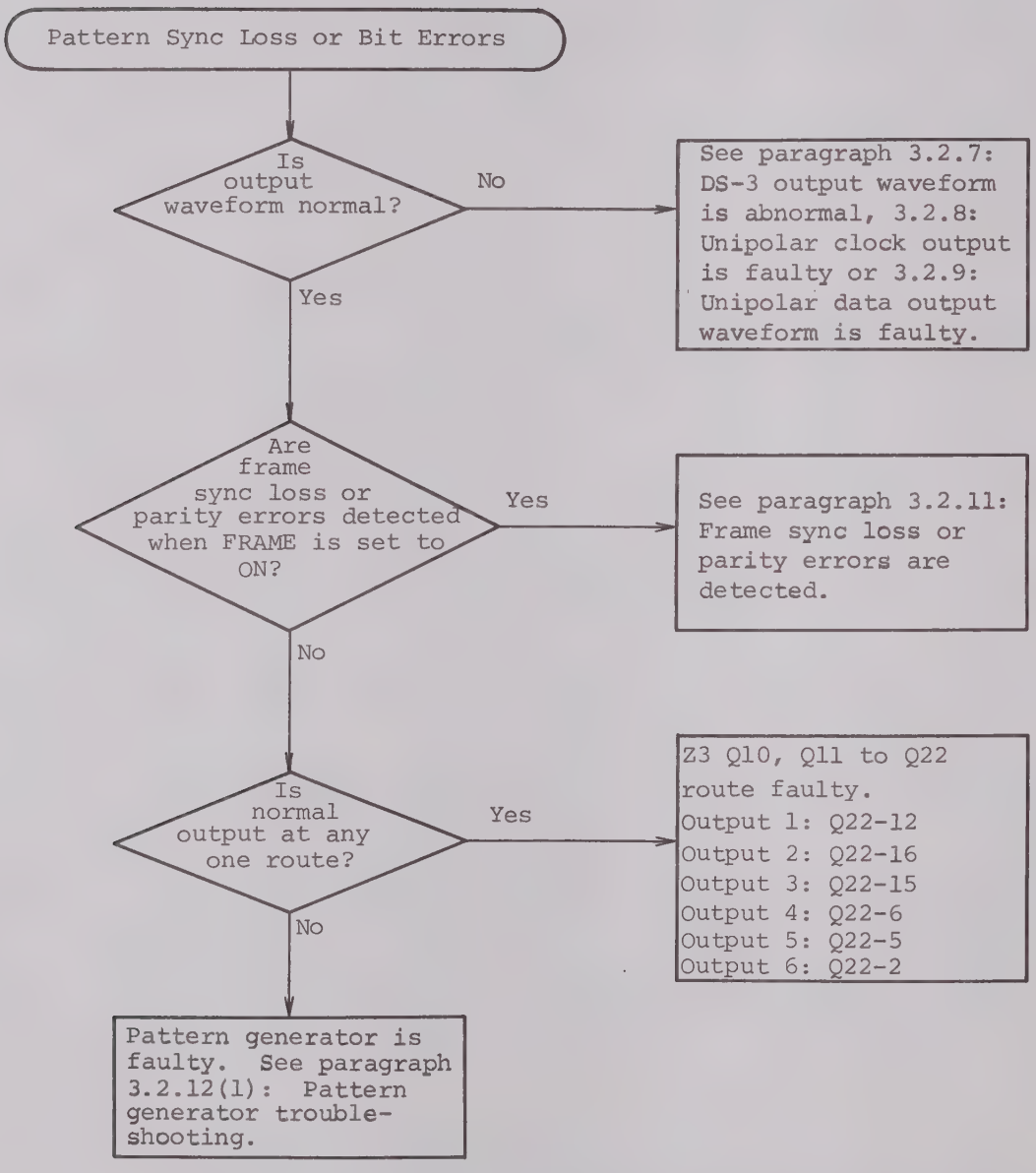

Pattern Sync Loss or Bit Errors
Is output waveform normal?
No
See paragraph 3.2.7: DS-3 output waveform is abnormal, 3.2.8: Unipolar clock output is faulty or 3.2.9: Unipolar data output waveform is faulty.
Yes
Are frame sync loss or parity errors detected when FRAME is set to ON?
Yes
See paragraph 3.2.11: Frame sync loss or parity errors are detected.
No
Is normal output at any one route?
Yes
Z3 Q10, Q11 to Q22 route faulty.
Output 1: Q22-12
Output 2: Q22-16
Output 3: Q22-15
Output 4: Q22-6
Output 5: Q22-5
Output 6: Q22-2
No
Pattern generator is faulty. See paragraph 3.2.12(1): Pattern generator trouble-shooting.

Fig. 3-20 Pattern Generator Troubleshooting Flowchart

3.2.12 (1) Pattern Generator

The PRBS (Pseudo-Random Bit Sequence) pattern and fixed pattern are generated from a common circuit. The generation circuit for the patterns is shown in Figs. 3-24 to 3-27. Although not shown in Figs. 3-24 to 3-27, the exclusive-OR gate of Q13, Q14, and Q15 in Z3 provides a phase difference between the outputs for PRBS pattern.

These circuits are also used for the fixed pattern. The same fixed pattern as the fixed pattern circuit is finally obtained from the logical expressions

$$X^n + X^{n+4} = X^n + X^n = 0.$$

The signal of Q16-4 in Fig. 3-26 or 3-27 is for constantly continuing the 1010 pattern after the frame bit.

Q10 and Q11 are an 8-bit register.

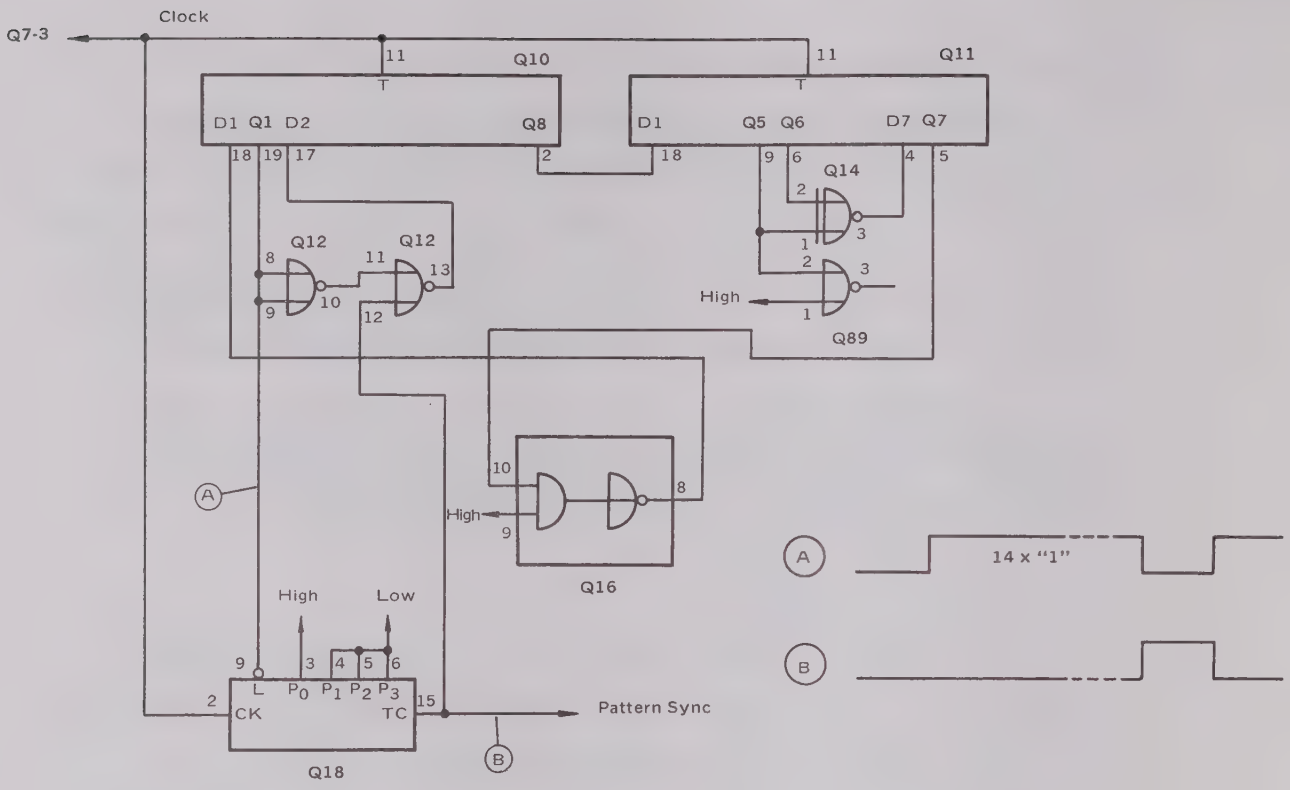


Fig. 3-24 PRBS Pattern Generator

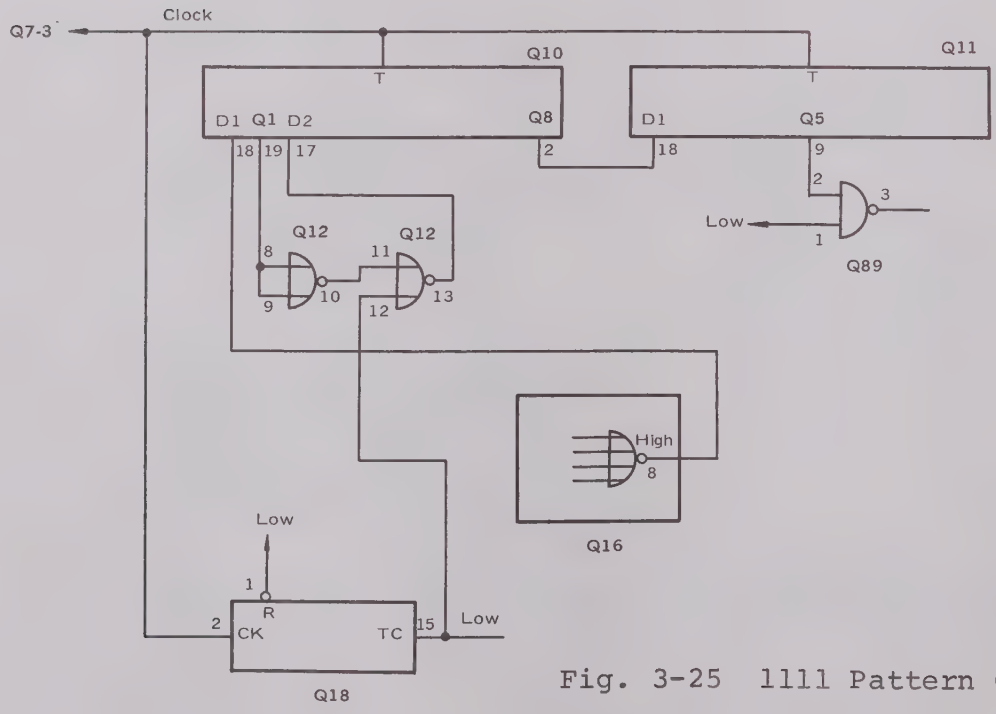


Fig. 3-25 1111 Pattern Generators

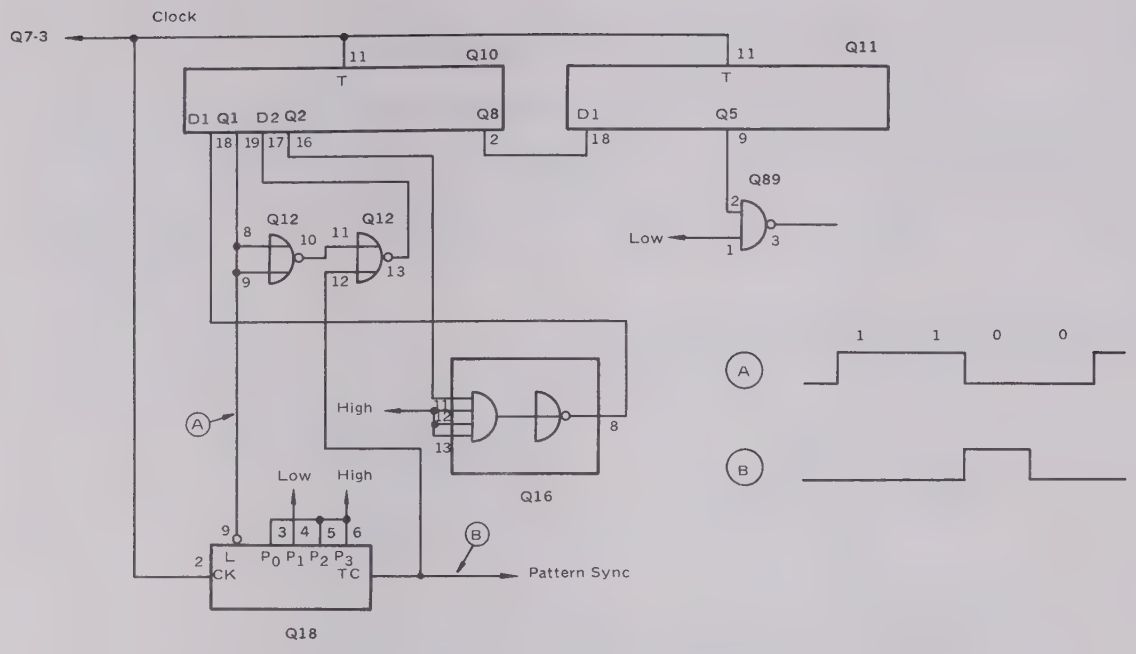


Fig. 3-26 1100 Pattern Generator

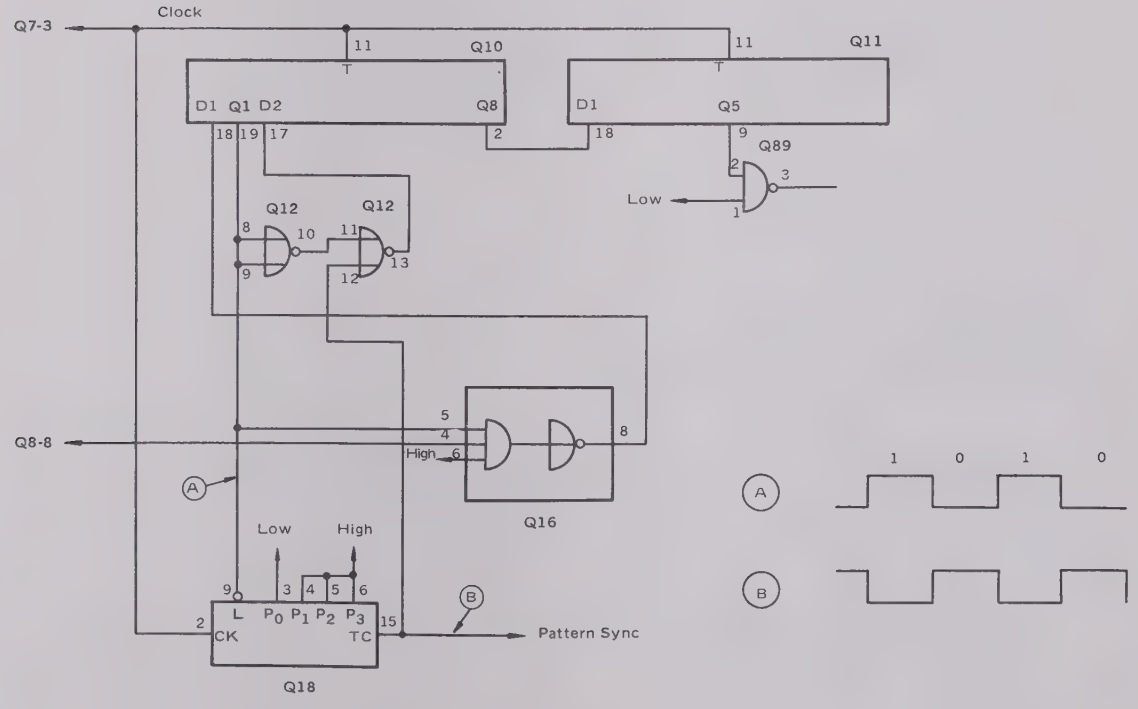


Fig. 3-27 1010 Pattern Generators

3.2.13 Error Addition Circuit Troubleshooting

Refer to
- 3 Overall Circuit of Transmitter, 43W30643 (2/2)
- 4 Power Supply Circuit (Z2) 43W30644 (4/5, 5/5)
- 5 Pattern Generator (Z3) 43W30645 (2/15 to 5/15, 14/15)

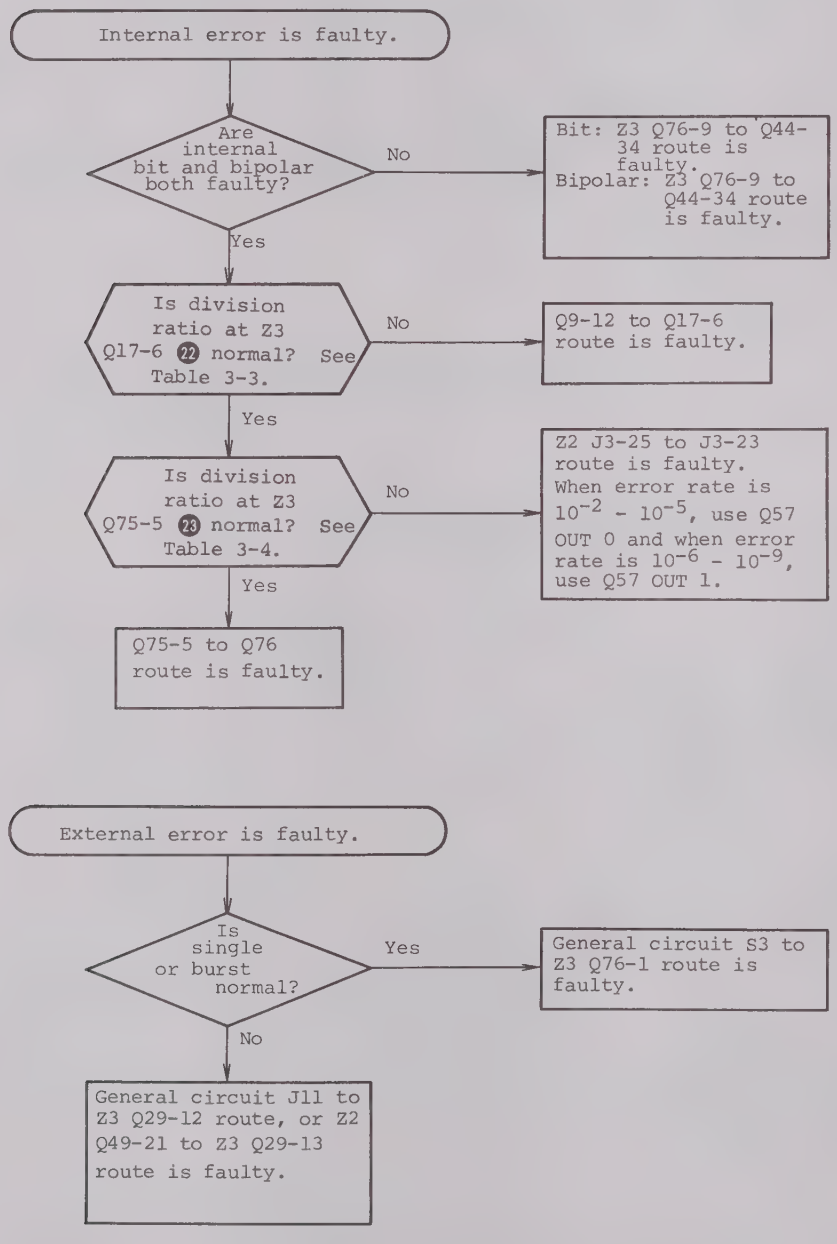

Internal error is faulty.
Are internal bit and bipolar both faulty?
No
Bit: Z3 Q76-9 to Q44-34 route is faulty.
Bipolar: Z3 Q76-9 to Q44-34 route is faulty.
Yes
Is division ratio at Z3 Q17-6 22 normal? See Table 3-3.
No
Q9-12 to Q17-6 route is faulty.
Yes
Is division ratio at Z3 Q75-5 23 normal? See Table 3-4.
No
Z2 J3-25 to J3-23 route is faulty. When error rate is 10^{-2} - 10^{-5}, use Q57 OUT 0 and when error rate is 10^{-6} - 10^{-9}, use Q57 OUT 1.
Yes
Q75-5 to Q76 route is faulty.
External error is faulty.
Is single or burst normal?
Yes
General circuit S3 to Z3 Q76-1 route is faulty.
No
General circuit J11 to Z3 Q29-12 route, or Z2 Q49-21 to Z3 Q29-13 route is faulty.

Fig. 3-28 Error Addition Circuit Troubleshooting Flowchart

Table 3-3 Division ratio (I)

Setting	Division ratio (for clock)
Frame-OFF	25
Frame-ON and Error Rate 10^{-3} or 10^{-5}	27
Frame-ON and Error Rate 10^{-2}, 10^{-4}, 10^{-6}, 10^{-9}	33

Table 3-4 Division ratio (II)

Setting	Division ratio (for Q17-6)	
	Frame-OFF	Frame-ON
Error Rate 10^{-2}	4	3
Error Rate 10^{-3}	4 x 10	37
Error Rate 10^{-4}	4 x 10^{2}	303
Error Rate 10^{-5}	4 x 10^{3}	3,704
Error Rate 10^{-6}	4 x 10^{4}	30,303
Error Rate 10^{-7}	4 x 10^{5}	303,031
Error Rate 10^{-8}	4 x 10^{6}	3,030,303
Error Rate 10^{-9}	4 x 10^{7}	30,303,031

3.2.14 Sync Output Circuit Troubleshooting

Refer to
- 3 Overall Circuit of Transmitter : 43W30643 (2/2)
- 5 Pattern Generator (Z3) 43W30645: (1/15, 2/15, 4/15, 14/15)

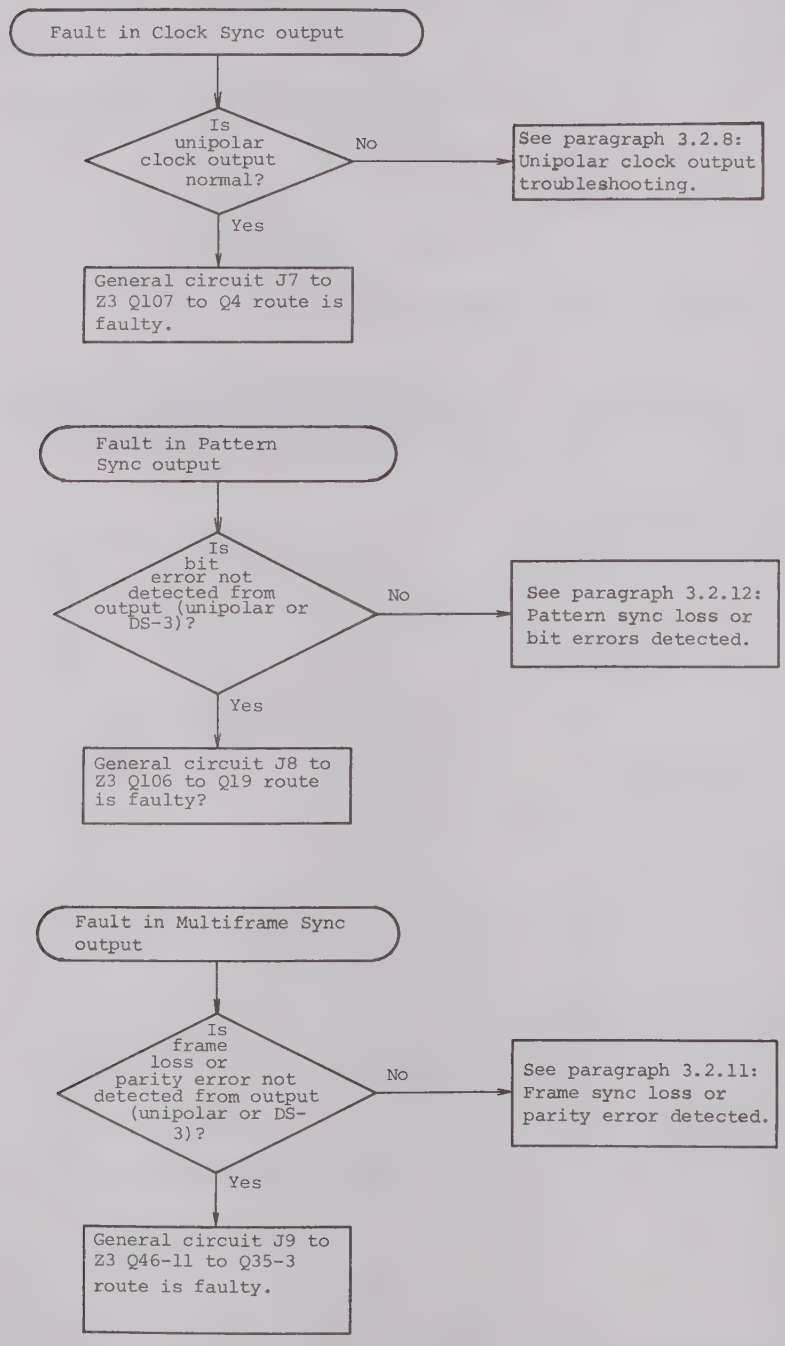

Fault in Clock Sync output
Is unipolar clock output normal?
No
See paragraph 3.2.8: Unipolar clock output troubleshooting.
Yes
General circuit J7 to Z3 Q107 to Q4 route is faulty.
Fault in Pattern Sync output
Is bit error not detected from output (unipolar or DS-3)?
No
See paragraph 3.2.12: Pattern sync loss or bit errors detected.
Yes
General circuit J8 to Z3 Q106 to Q19 route is faulty?
Fault in Multiframe Sync output
Is frame loss or parity error not detected from output (unipolar or DS-3)?
No
See paragraph 3.2.11: Frame sync loss or parity error detected.
Yes
General circuit J9 to Z3 Q46-11 to Q35-3 route is faulty.

Fig. 3-29 Sync Output Circuit Troubleshooting Flowchart

3.2.15 Control Circuit Troubleshooting

Refer to [4] Power Supply Circuit (Z2): 43W30644 (1/5 to 5/5)

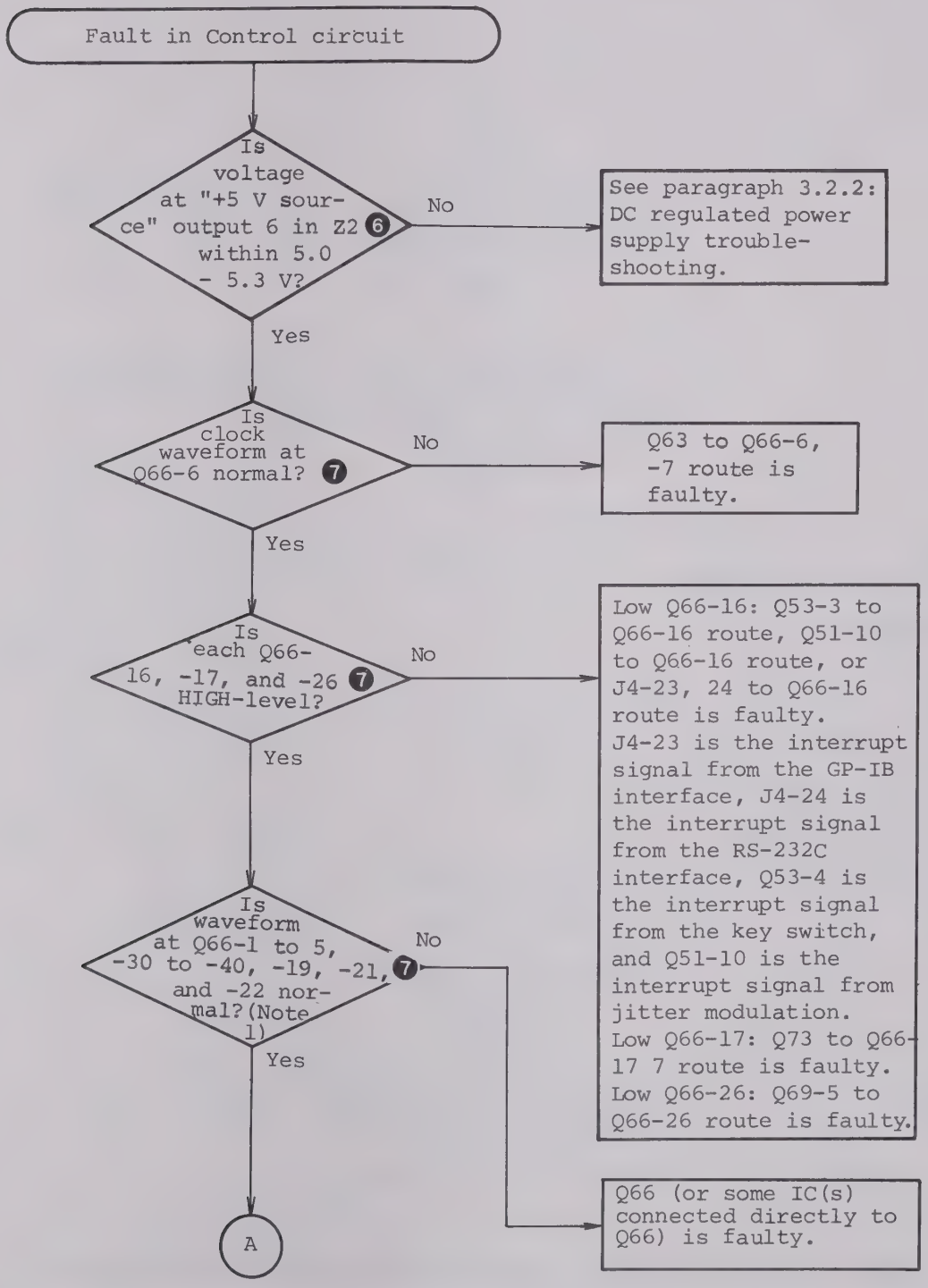
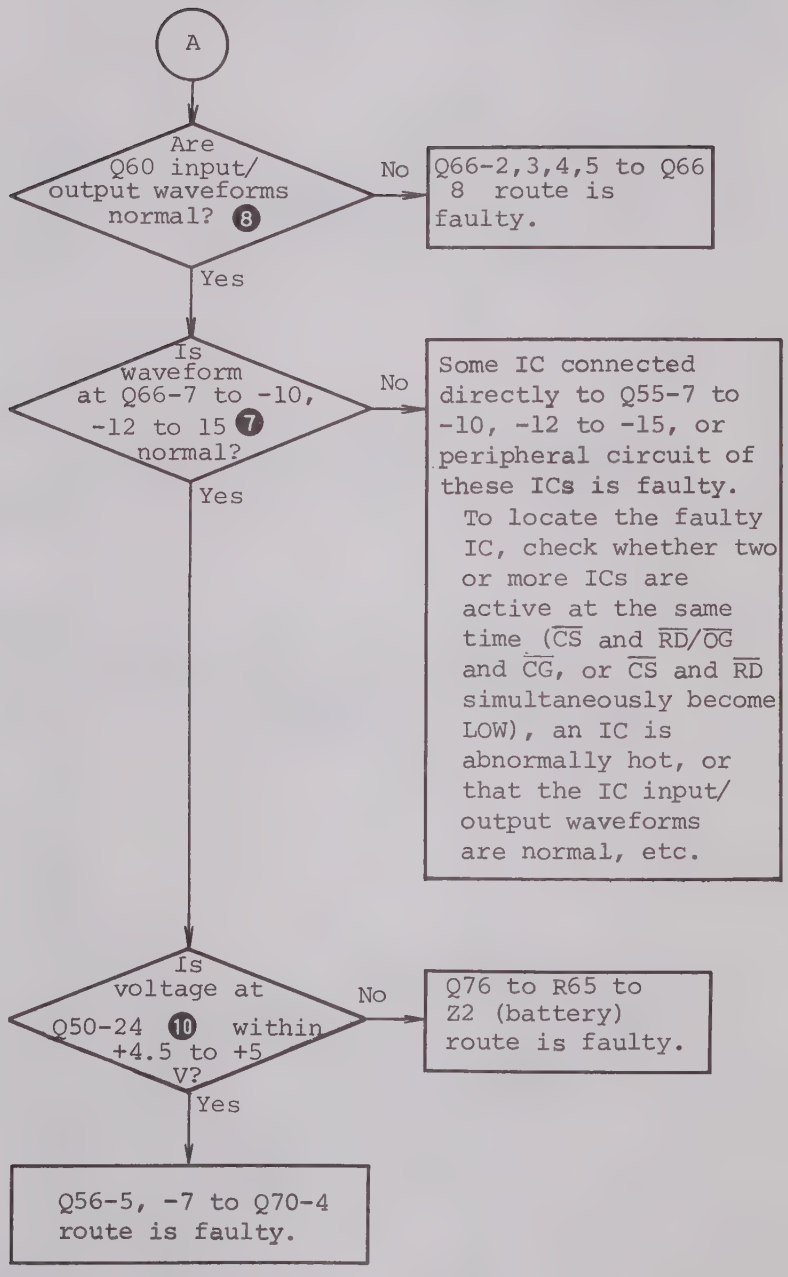

Fault in Control circuit
Is voltage at "+5 V source" output 6 in Z2 within 5.0 - 5.3 V? 6
No
See paragraph 3.2.2: DC regulated power supply troubleshooting.
Yes
Is clock waveform at Q66-6 normal? 7
No
Q63 to Q66-6, -7 route is faulty.
Yes
Is each Q66-16, -17, and -26 HIGH-level? 7
No
Low Q66-16: Q53-3 to Q66-16 route, Q51-10 to Q66-16 route, or J4-23, 24 to Q66-16 route is faulty. J4-23 is the interrupt signal from the GP-IB interface, J4-24 is the interrupt signal from the RS-232C interface, Q53-4 is the interrupt signal from the key switch, and Q51-10 is the interrupt signal from jitter modulation. Low Q66-17: Q73 to Q66-17 7 route is faulty. Low Q66-26: Q69-5 to Q66-26 route is faulty.
Yes
Is waveform at Q66-1 to 5, -30 to -40, -19, -21, and -22 normal? (Note 1) 7
No
Q66 (or some IC(s) connected directly to Q66) is faulty.
Yes
A

Fig. 3-30 Control Circuit Troubleshooting Flowchart (1/2)


A
Are Q60 input/ output waveforms normal? 8
No
Q66-2,3,4,5 to Q66 8 route is faulty.
Yes
Is waveform at Q66-7 to -10, -12 to 15 7 normal?
No
Some IC connected directly to Q55-7 to -10, -12 to -15, or peripheral circuit of these ICs is faulty. To locate the faulty IC, check whether two or more ICs are active at the same time (CS and RD/OG and CG, or CS and RD simultaneously become LOW), an IC is abnormally hot, or that the IC input/ output waveforms are normal, etc.
Yes
Is voltage at Q50-24 10 within +4.5 to +5 V?
No
Q76 to R65 to Z2 (battery) route is faulty.
Yes
Q56-5, -7 to Q70-4 route is faulty.

Note

When a pulse is not output from any of these terminals, if that High/Low level is +2.4 V or more/0.5 V or less, since it is often caused by a fault at another circuit, proceed to the flow after the next before going to "YES".

Fig. 3-30 (Cont.) Control Circuit Troubleshooting Flowchart

3.2.16 GP-IB or RS-232C Interface Troubleshooting

Refer to [4] Power Supply Circuit (Z2): 43W30644 (2/5, 3/5, 5/5)

Make the checks below by referring to subsection 4.4.10 "GP-IB interface"/4.4.11 "RS-232C interface check" of the Operation Manual and then executing the program.

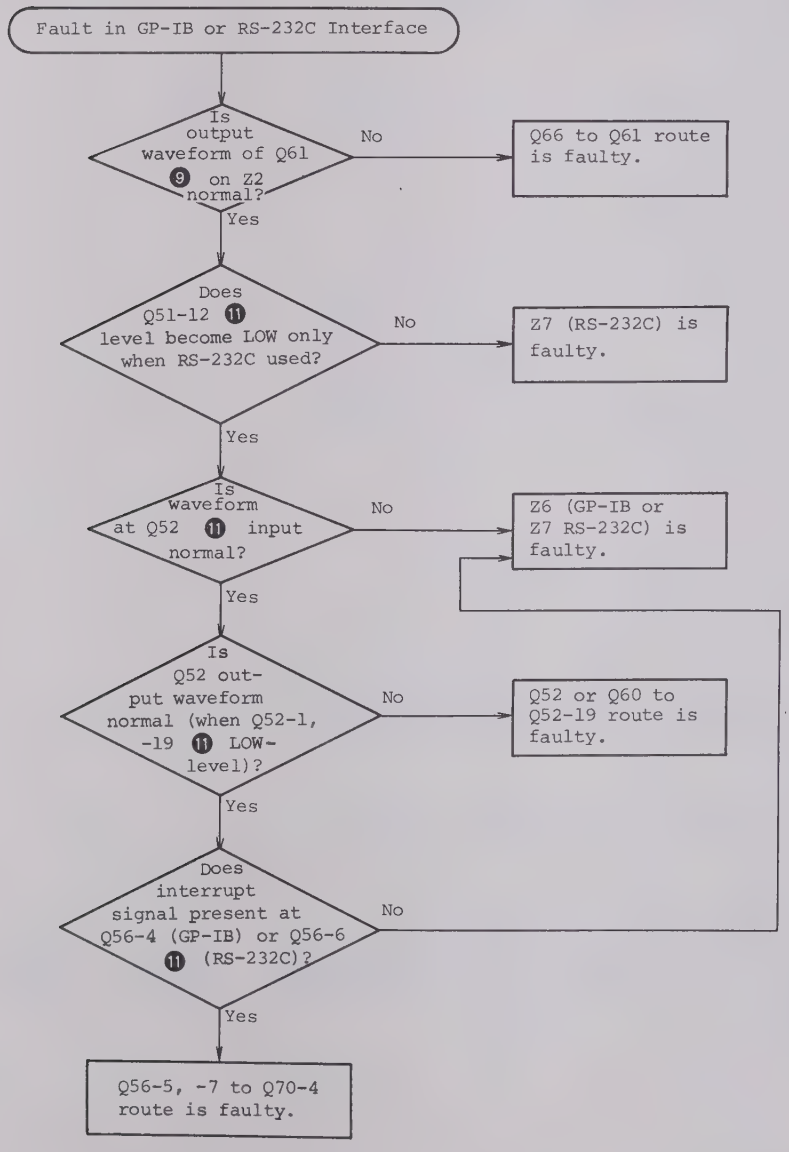

Fault in GP-IB or RS-232C Interface
Is output waveform of Q61 ⑨ on Z2 normal?
No
Q66 to Q61 route is faulty.
Yes
Does Q51-12 ⑪ level become LOW only when RS-232C used?
No
Z7 (RS-232C) is faulty.
Yes
Is waveform at Q52 ⑪ input normal?
No
Z6 (GP-IB or Z7 RS-232C) is faulty.
Yes
Is Q52 output waveform normal (when Q52-1, -19 ⑪ LOW-level)?
No
Q52 or Q60 to Q52-19 route is faulty.
Yes
Does interrupt signal present at Q56-4 (GP-IB) or Q56-6 ⑪ (RS-232C)?
No
Yes
Q56-5, -7 to Q70-4 route is faulty.

Fig. 3-31 GP-IB or RS-232C Interface Troubleshooting Flowchart

3.3 Receiver Troubleshooting

When a failure occurs with the ME462B receiver, select the corresponding item from the following Troubleshooting items and make repairs in accordance with the flow in each one.

(1) Power-on lamp does not light.

(2) DC regulated power supply (+5 V, +24 V, -12 V) is faulty.

(3) Front panel LED or key switch is faulty.

(4) Errors detected for error-free signal.

(5) DS-3 input circuit is faulty.

(6) B3ZS reverse converter is faulty.

(7) Unipolar input circuit is faulty.

(8) Framing circuit is faulty.

(9) Error detector is faulty.

(10) Counter is faulty.

(11) Error seconds (ES) or error free seconds (EFS) are faulty.

(12) Alarm display or buzzer is faulty.

(13) Measuring time or real-time is faulty.

(14) Output (CLOCK SYNC, MULTIFRAME SYNC, X-BIT, ERROR) is faulty.

(15) Monitor input is faulty.

(16) Function switch is faulty.

(17) Control circuit is faulty.

(18) Printer is faulty.

(19) GP-IB or RS-232C interface is faulty.

3.3.1 Power-ON Lamp Troubleshooting

Refer to

- 10 Overall circuit of Receiver: 43W30647
- 11 Control Circuit (Z2) : 43W30649 (5/5)
- 12 Bit Error Detector (Z3) : 43W30648 (1/3)

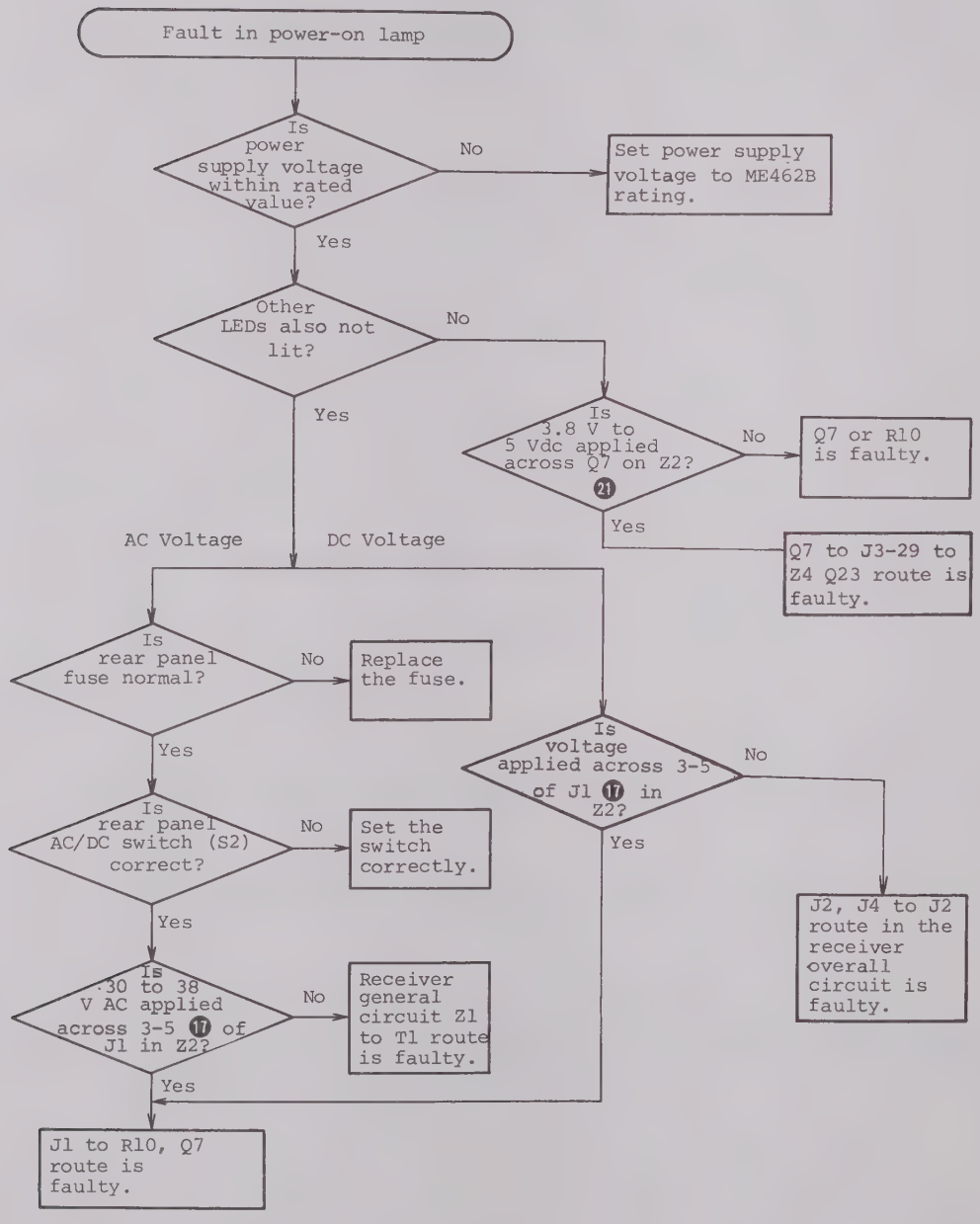

Fault in power-on lamp
Is power supply voltage within rated value?
No
Set power supply voltage to ME462B rating.
Yes
Other LEDs also not lit?
No
Yes
Is 3.8 V to 5 Vdc applied across Q7 on Z2? 21
No
Q7 or R10 is faulty.
Yes
Q7 to J3-29 to Z4 Q23 route is faulty.
AC Voltage
DC Voltage
Is rear panel fuse normal?
No
Replace the fuse.
Yes
Is rear panel AC/DC switch (S2) correct?
No
Set the switch correctly.
Yes
Is 30 to 38 V AC applied across 3-5 17 of J1 in Z2?
No
Receiver general circuit Z1 to T1 route is faulty.
Yes
J1 to R10, Q7 route is faulty.
Is voltage applied across 3-5 of J1 17 in Z2?
No
J2, J4 to J2 route in the receiver overall circuit is faulty.
Yes

Fig. 3-32 Power-ON Lamp Troubleshooting Flowchart

3.3.2 Regulated DC Power Supply Troubleshooting

Refer to [4] Power Supply Circuit (Z2): 43W30644 (5/5)

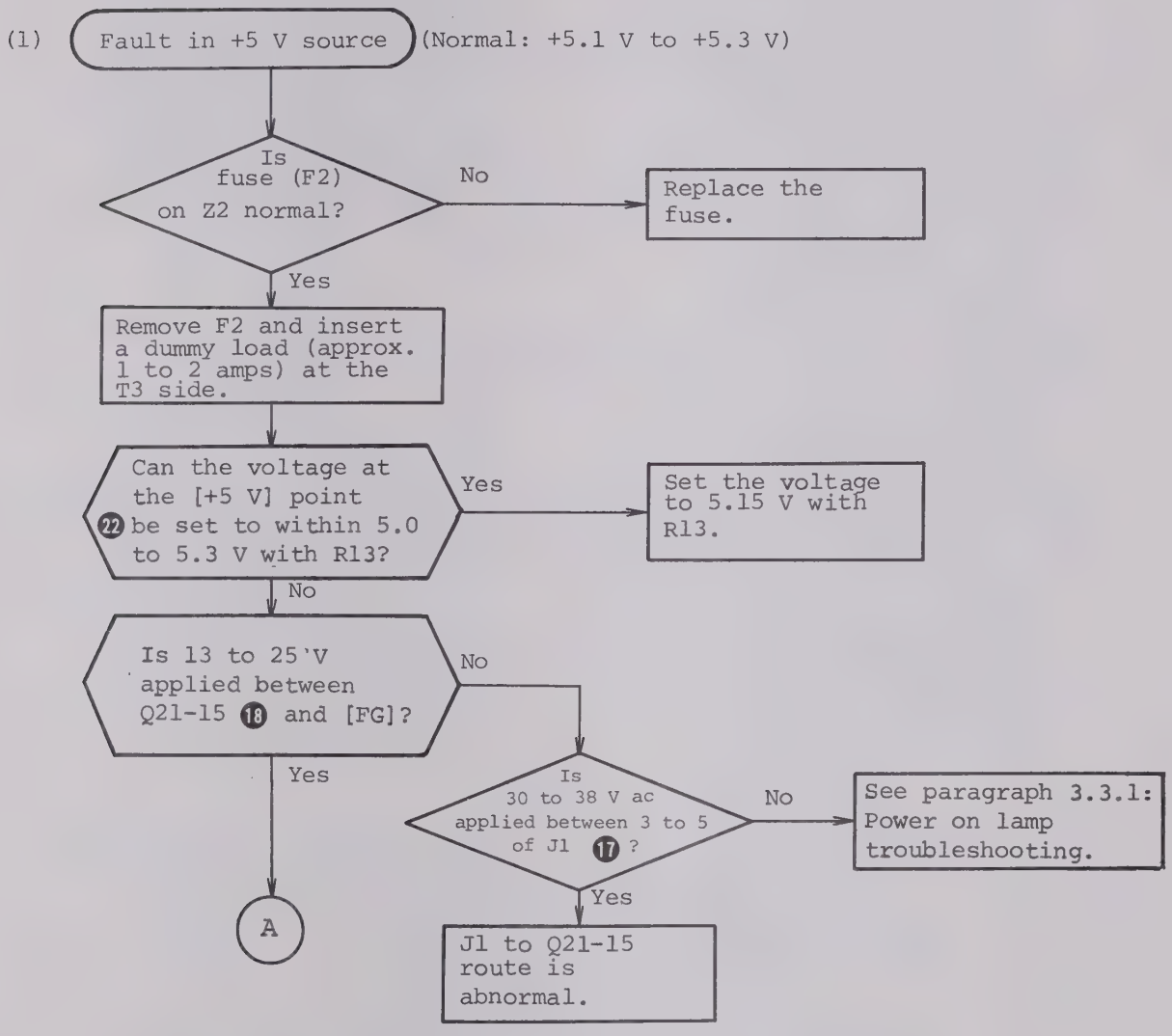

(1)
Fault in +5 V source
(Normal: +5.1 V to +5.3 V)
Is fuse (F2) on Z2 normal?
No
Replace the fuse.
Yes
Remove F2 and insert a dummy load (approx. 1 to 2 amps) at the T3 side.
Can the voltage at the [+5 V] point 22 be set to within 5.0 to 5.3 V with R13?
Yes
Set the voltage to 5.15 V with R13.
No
Is 13 to 25 V applied between Q21-15 18 and [FG]?
No
Yes
Is 30 to 38 V ac applied between 3 to 5 of J1 17 ?
No
See paragraph 3.3.1: Power on lamp troubleshooting.
Yes
J1 to Q21-15 route is abnormal.
A

Fig. 3-33 Regulated DC Power Supply Troubleshooting Flowchart (+5 V)

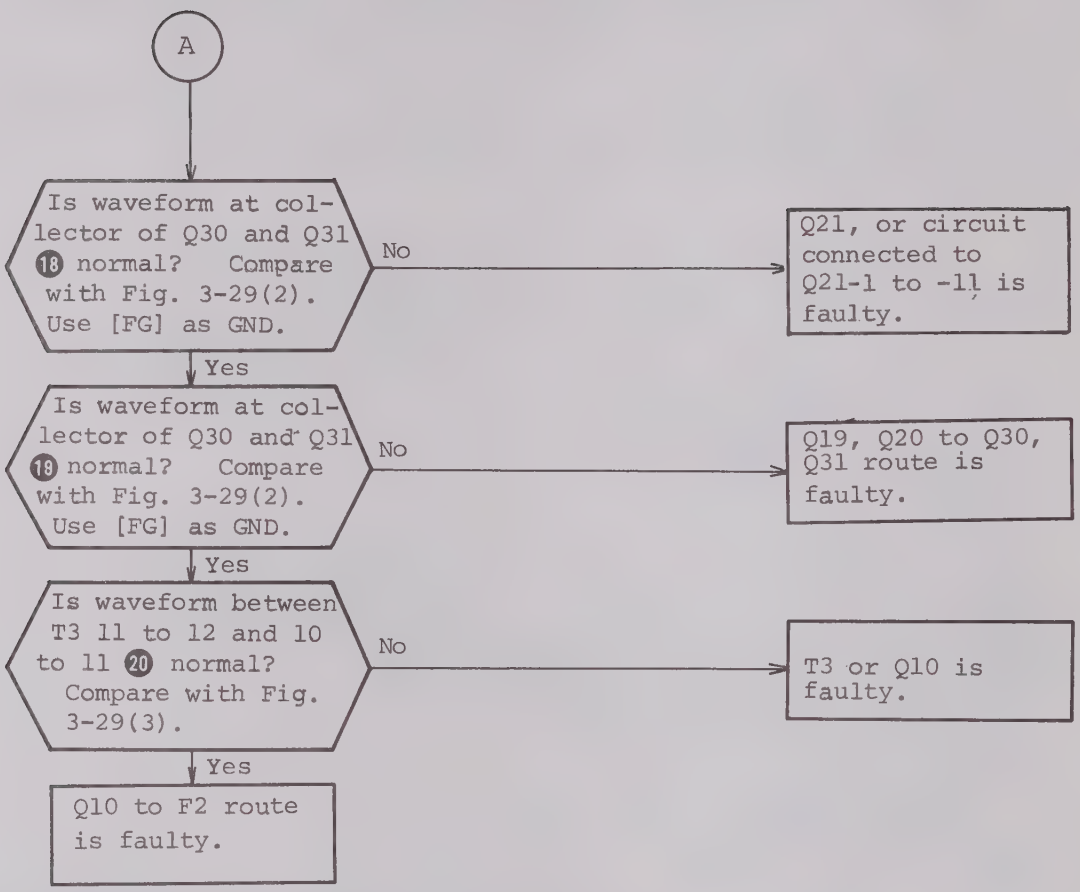

A
Is waveform at collector of Q30 and Q31 ⑱ normal? Compare with Fig. 3-29(2). Use [FG] as GND.
No
Q21, or circuit connected to Q21-1 to -11 is faulty.
Yes
Is waveform at collector of Q30 and Q31 ⑱ normal? Compare with Fig. 3-29(2). Use [FG] as GND.
No
Q19, Q20 to Q30, Q31 route is faulty.
Yes
Is waveform between T3 11 to 12 and 10 to 11 ⑳ normal? Compare with Fig. 3-29(3).
No
T3 or Q10 is faulty.
Yes
Q10 to F2 route is faulty.

Fig. 3-33 (Cont.) Regulated DC Power Supply Troubleshooting Flowchart (+5 V)

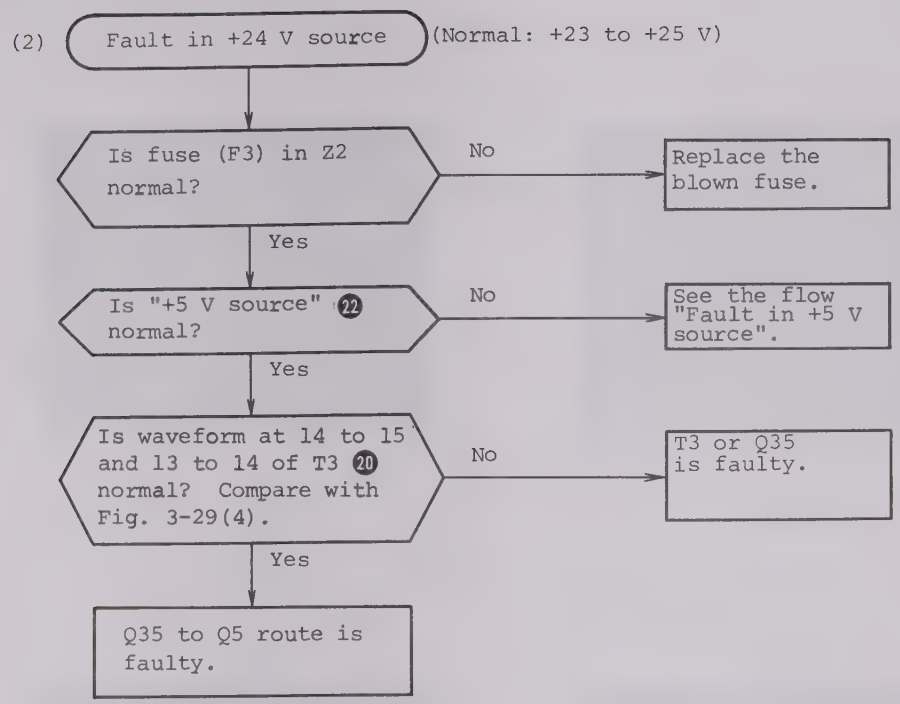

(2)
Fault in +24 V source
(Normal: +23 to +25 V)
Is fuse (F3) in Z2 normal?
No
Replace the blown fuse.
Yes
Is "+5 V source" 22 normal?
No
See the flow "Fault in +5 V source".
Yes
Is waveform at 14 to 15 and 13 to 14 of T3 20 normal? Compare with Fig. 3-29(4).
No
T3 or Q35 is faulty.
Yes
Q35 to Q5 route is faulty.

Fig. 3-34 Regulated DC Power Supply Troubleshooting Flowchart (-12 V)

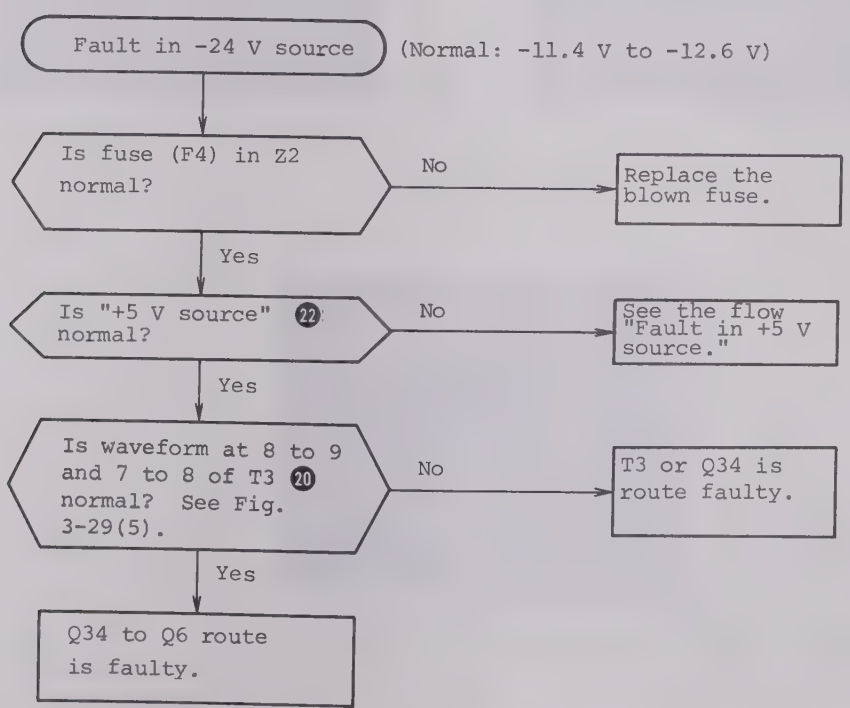
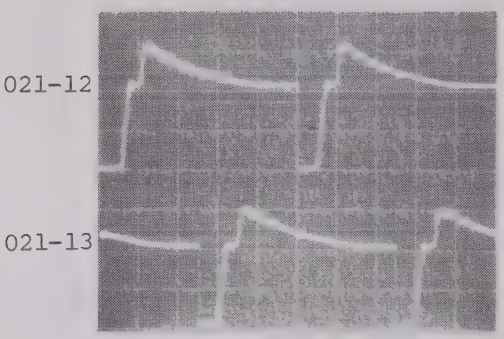
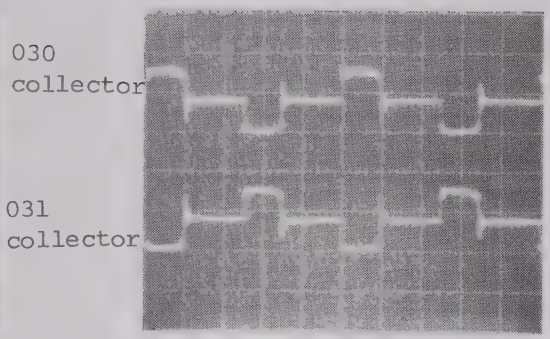

Fault in -24 V source
(Normal: -11.4 V to -12.6 V)
Is fuse (F4) in Z2 normal?
No
Replace the blown fuse.
Yes
Is "+5 V source" 22 normal?
No
See the flow "Fault in +5 V source."
Yes
Is waveform at 8 to 9 and 7 to 8 of T3 20 normal? See Fig. 3-29(5).
No
T3 or Q34 is route faulty.
Yes
Q34 to Q6 route is faulty.

Fig. 3-35 Regulated DC Power Supply Troubleshooting Flowchart (-12 V)



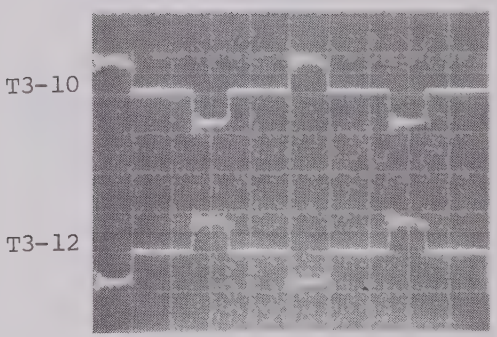
10 V/div, 5 μs/div

(1)



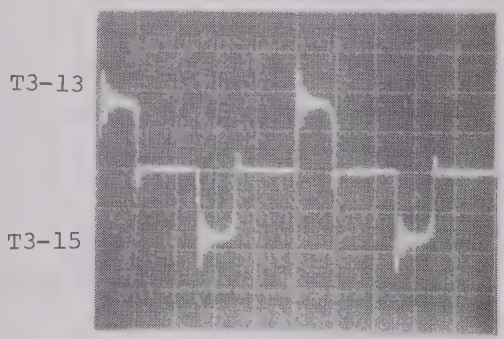
50 V/div, 5 μs/div

(2)



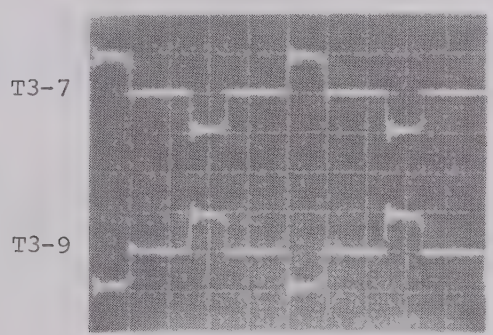
20 V/div, 5 μs/div

(3)



50 V/div, 5 μs/div

(4)



50 V/div, 5 μs/div

(5)

Fig. 3-29 Waveforms of Main Parts of Receiver Power Supply Circuit

3.3.3 Front Panel LED or Key Switch Troubleshooting

Refer to
- 4 Power Supply Circuit (Z2): 43W30644 (2/5, 4/5)
- 6 Front Panel Circuit (Z4) : 43W30646 (1/3 to 3/3)

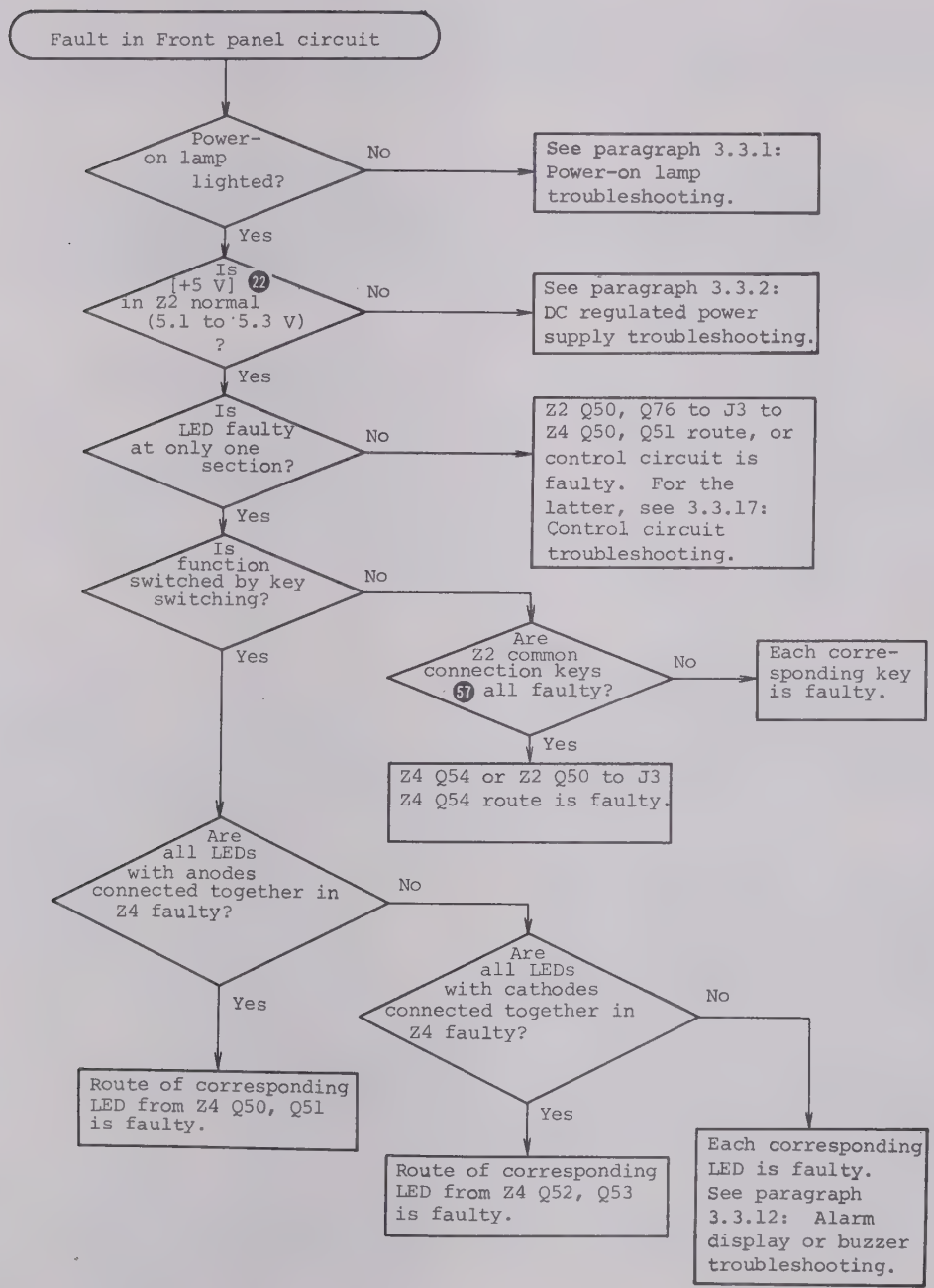

Fault in Front panel circuit
Power-on lamp lighted?
No
See paragraph 3.3.1: Power-on lamp troubleshooting.
Yes
Is [+5 V] 22 in Z2 normal (5.1 to 5.3 V) ?
No
See paragraph 3.3.2: DC regulated power supply troubleshooting.
Yes
Is LED faulty at only one section?
No
Z2 Q50, Q76 to J3 to Z4 Q50, Q51 route, or control circuit is faulty. For the latter, see 3.3.17: Control circuit troubleshooting.
Yes
Is function switched by key switching?
No
Are Z2 common connection keys 57 all faulty?
No
Each corresponding key is faulty.
Yes
Z4 Q54 or Z2 Q50 to J3 Z4 Q54 route is faulty.
Yes
Are all LEDs with anodes connected together in Z4 faulty?
No
Are all LEDs with cathodes connected together in Z4 faulty?
No
Each corresponding LED is faulty. See paragraph 3.3.12: Alarm display or buzzer troubleshooting.
Yes
Route of corresponding LED from Z4 Q52, Q53 is faulty.
Yes
Route of corresponding LED from Z4 Q50, Q51 is faulty.

Fig. 3-37 Front Panel LED or Key Switch Troubleshooting Flowchart

3.3.4 Error Circuit Troubleshooting

Refer to [12] Bit Error Detector (Z3): 43W30648 (2/10 to 4/10)

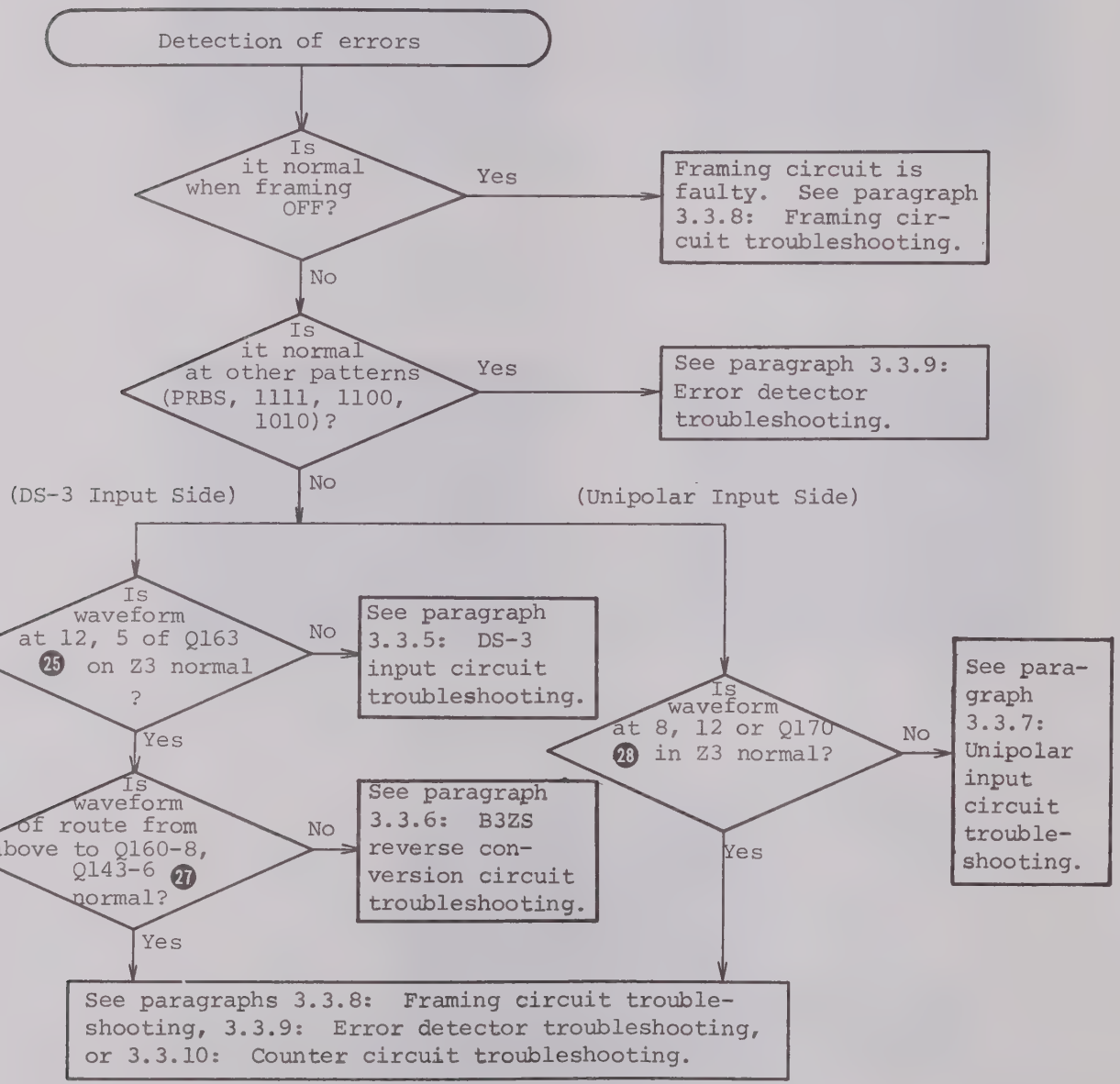

Detection of errors
Is it normal when framing OFF?
Yes
Framing circuit is faulty. See paragraph 3.3.8: Framing circuit troubleshooting.
No
Is it normal at other patterns (PRBS, 1111, 1100, 1010)?
Yes
See paragraph 3.3.9: Error detector troubleshooting.
No
(DS-3 Input Side)
(Unipolar Input Side)
Is waveform at 12, 5 of Q163 25 on Z3 normal ?
No
See paragraph 3.3.5: DS-3 input circuit troubleshooting.
Yes
Is waveform of route from above to Q160-8, Q143-6 27 normal?
No
See paragraph 3.3.6: B3ZS reverse conversion circuit troubleshooting.
Yes
Is waveform at 8, 12 or Q170 28 in Z3 normal?
No
See paragraph 3.3.7: Unipolar input circuit troubleshooting.
Yes
See paragraphs 3.3.8: Framing circuit troubleshooting, 3.3.9: Error detector troubleshooting, or 3.3.10: Counter circuit troubleshooting.

Fig. 3-38 Error Circuit Troubleshooting Flowchart

3.3.5 DS-3 Input Circuit Troubleshooting

Refer to [12] Bit Error Detector (Z3): 43W30648 (1/10, 2/10)

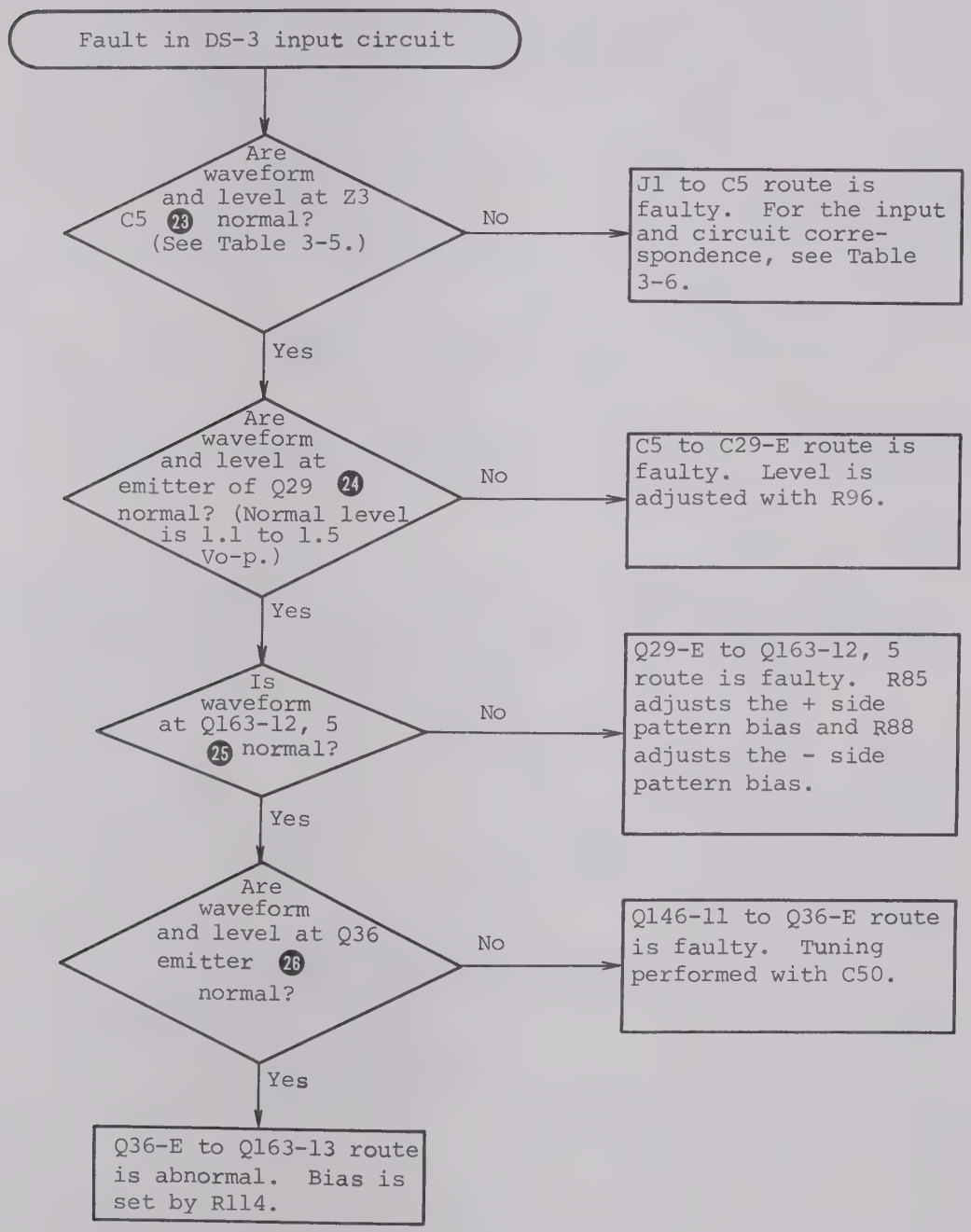

Fault in DS-3 input circuit
Are waveform and level at Z3 C5 (23) normal? (See Table 3-5.)
No
J1 to C5 route is faulty. For the input and circuit correspondence, see Table 3-6.
Yes
Are waveform and level at emitter of Q29 (24) normal? (Normal level is 1.1 to 1.5 Vo-p.)
No
C5 to C29-E route is faulty. Level is adjusted with R96.
Yes
Is waveform at Q163-12, 5 (25) normal?
No
Q29-E to Q163-12, 5 route is faulty. R85 adjusts the + side pattern bias and R88 adjusts the - side pattern bias.
Yes
Are waveform and level at Q36 emitter (26) normal?
No
Q146-11 to Q36-E route is faulty. Tuning performed with C50.
Yes
Q36-E to Q163-13 route is abnormal. Bias is set by R114.

Fig. 3-39 DS-3 Input Circuit Troubleshooting Flowchart

Table 3-5 Level at C5

INPUT	Level at C5 (example)	Input level
HIGH	approx. 0.28 Vo-p	Transmitter HIGH
DSX-3	approx. 0.37 Vo-p	Transmitter DSX-3
LOW	approx. 0.45 Vo-p	Level of transmitter HIGH attenuated 20 dB.
DSX-3 LOW	approx. 0.48 Vo-p	Level of transmitter DSX-3 attenuated 20 dB.

Table 3-6 Input and Circuit Correspondence

INPUT	Circuit	Remarks
HIGH	Q1 to Q2 to Q3	
DSX-3	Q1 to Q5 to Q7 to Q4 Q64 to Q16 to Q11, 12, 13	$\sqrt{f}$ AGC circuit (Q5 to Q7) gain is adjusted with R48. (Example: In the example in Table 3-5, R3-7 is approximately -8 V (normally -6 to -10 V)).
LOW	Q1 to Q9 to Q10	
DSX-3 LOW	Q1 to Q5 to Q8 to Q10 R52 to Q11, Q12, Q13	$\sqrt{f}$ AGC circuit (Q5 to Q7) gain is adjusted with R52. In this case, cable equalizing is performed not at 450 ft, but at about 900 ft. (Example: In the example in Table 3-5, the R3-7 is approximately -2.7 V (normally -2.3 to -3 V)).

3.3.6 B3ZS Reverse Conversion Circuit Troubleshooting

Refer to [12] Bit Error Detector (Z3): 43W30648 (3/10)

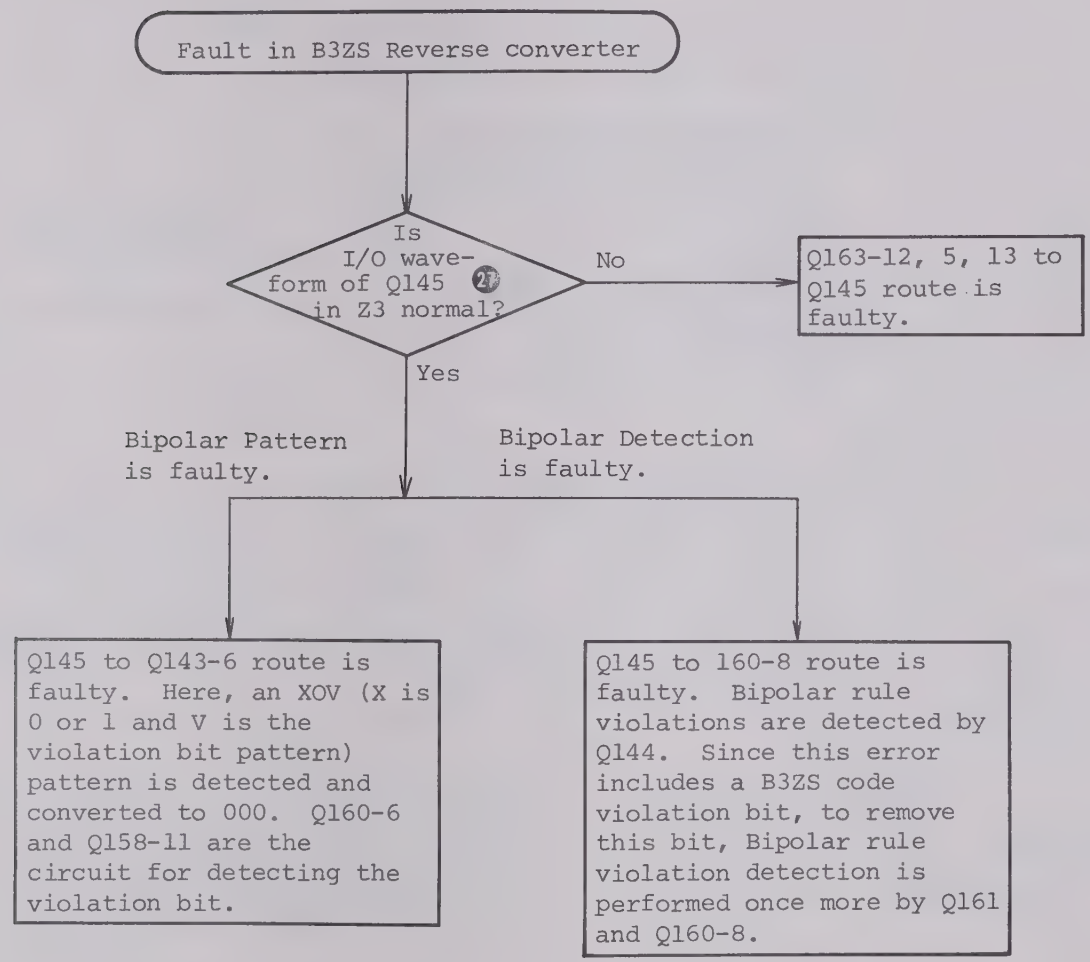

Fault in B3ZS Reverse converter
Is I/O waveform of Q145 (27) in Z3 normal?
No
Q163-12, 5, 13 to Q145 route is faulty.
Yes
Bipolar Pattern is faulty.
Bipolar Detection is faulty.
Q145 to Q143-6 route is faulty. Here, an XOV (X is 0 or 1 and V is the violation bit pattern) pattern is detected and converted to 000. Q160-6 and Q158-11 are the circuit for detecting the violation bit.
Q145 to 160-8 route is faulty. Bipolar rule violations are detected by Q144. Since this error includes a B3ZS code violation bit, to remove this bit, Bipolar rule violation detection is performed once more by Q161 and Q160-8.

Fig. 3-40 B3Z3 Reverse Conversion Circuit Troubleshooting Flowchart

3.3.7 Unipolar Input Circuit Troubleshooting

Refer to [12] Bit Error Detector (Z3): 43W30648 (4/10, 10/10)

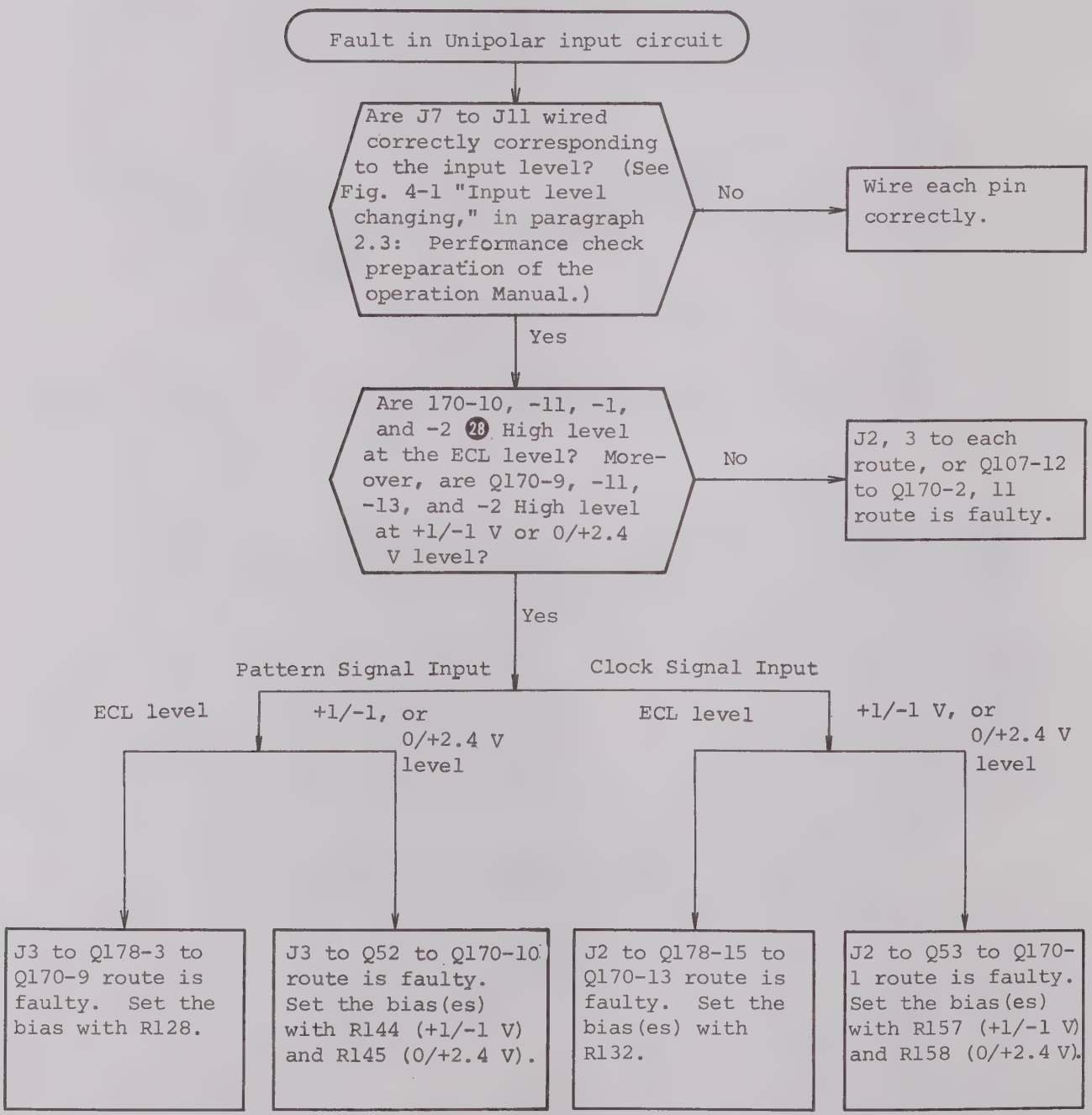

Fault in Unipolar input circuit
Are J7 to J11 wired correctly corresponding to the input level? (See Fig. 4-1 "Input level changing," in paragraph 2.3: Performance check preparation of the operation Manual.)
No
Wire each pin correctly.
Yes
Are 170-10, -11, -1, and -2 ㉘ High level at the ECL level? Moreover, are Q170-9, -11, -13, and -2 High level at +1/-1 V or 0/+2.4 V level?
No
J2, 3 to each route, or Q107-12 to Q170-2, 11 route is faulty.
Yes
Pattern Signal Input
Clock Signal Input
ECL level
+1/-1, or 0/+2.4 V level
ECL level
+1/-1 V, or 0/+2.4 V level
J3 to Q178-3 to Q170-9 route is faulty. Set the bias with R128.
J3 to Q52 to Q170-10 route is faulty. Set the bias(es) with R144 (+1/-1 V) and R145 (0/+2.4 V).
J2 to Q178-15 to Q170-13 route is faulty. Set the bias(es) with R132.
J2 to Q53 to Q170-1 route is faulty. Set the bias(es) with R157 (+1/-1 V) and R158 (0/+2.4 V).

Fig. 3-41 Unipolar Input Circuit Troubleshooting Flowchart

3.3.8 Framing Circuit Troubleshooting

Refer to [12] Bit Error Detector (Z3): 43W30648 (4/10, 5/10, 10/10)

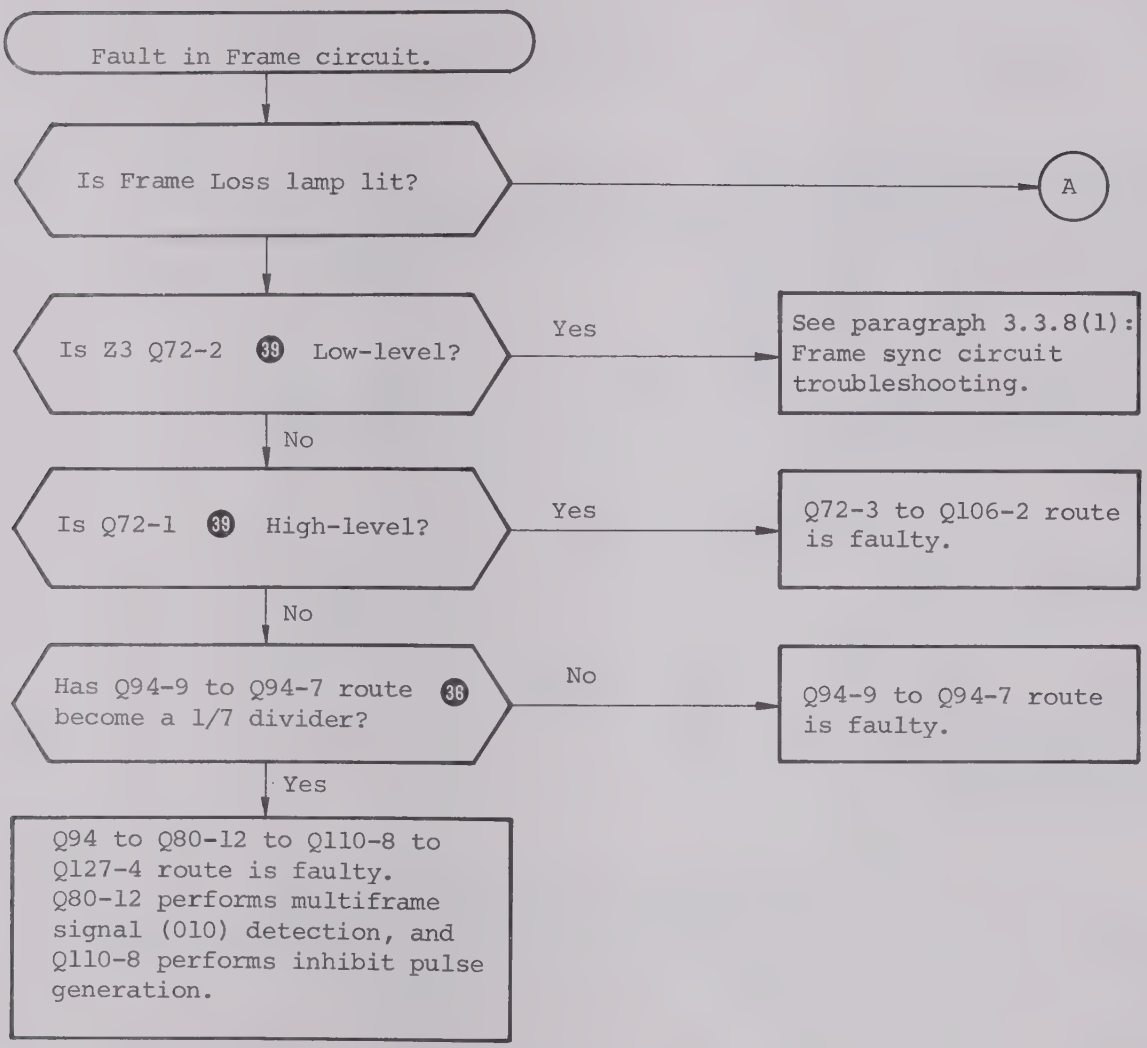

Fault in Frame circuit.
Is Frame Loss lamp lit?
A
Is Z3 Q72-2 39 Low-level?
Yes
See paragraph 3.3.8(1): Frame sync circuit troubleshooting.
No
Is Q72-1 39 High-level?
Yes
Q72-3 to Q106-2 route is faulty.
No
Has Q94-9 to Q94-7 route become a 1/7 divider? 38
No
Q94-9 to Q94-7 route is faulty.
Yes
Q94 to Q80-12 to Q110-8 to Q127-4 route is faulty. Q80-12 performs multiframe signal (010) detection, and Q110-8 performs inhibit pulse generation.

Fig. 3-42 Framing Circuit Troubleshooting Flowchart

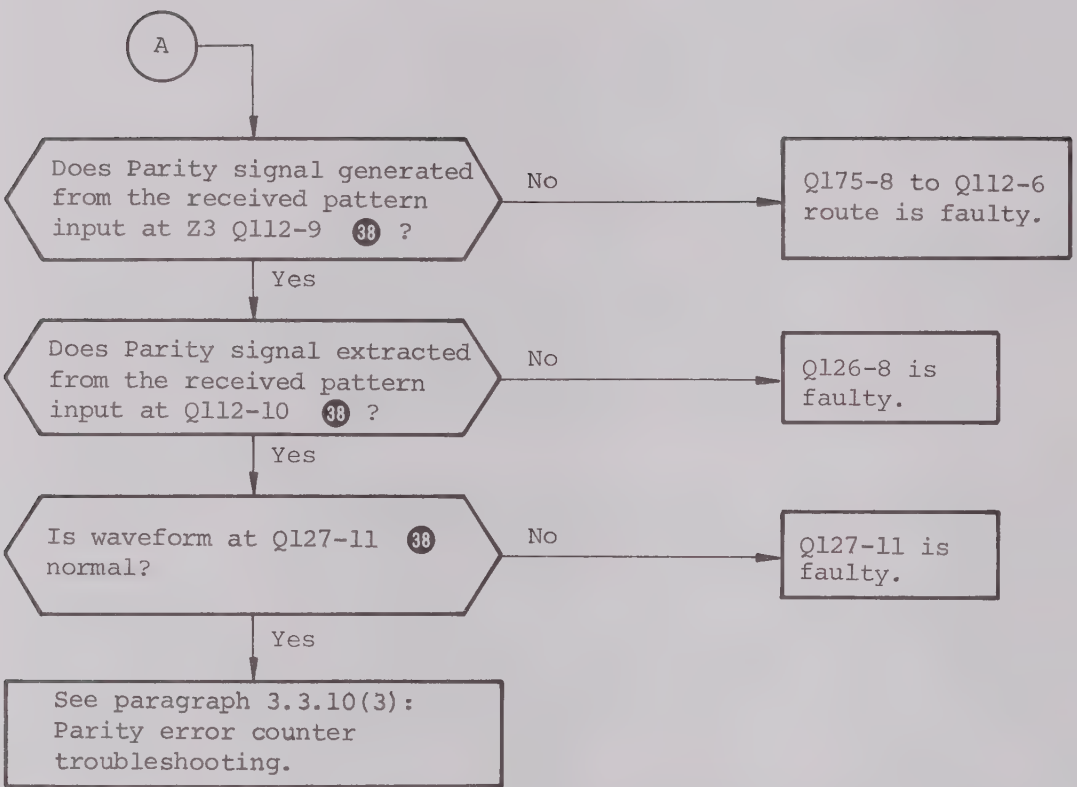

A
Does Parity signal generated from the received pattern input at Z3 Q112-9 38 ?
No
Q175-8 to Q112-6 route is faulty.
Yes
Does Parity signal extracted from the received pattern input at Q112-10 38 ?
No
Q126-8 is faulty.
Yes
Is waveform at Q127-11 38 normal?
No
Q127-11 is faulty.
Yes
See paragraph 3.3.10(3): Parity error counter troubleshooting.

Fig. 3-42 (Cont.) Framing Circuit Troubleshooting Flowchart

3.3.8 (1) Frame Sync Circuit

Refer to [12] Bit Error Detector (Z3): 43W30648 (4/10, 5/10)

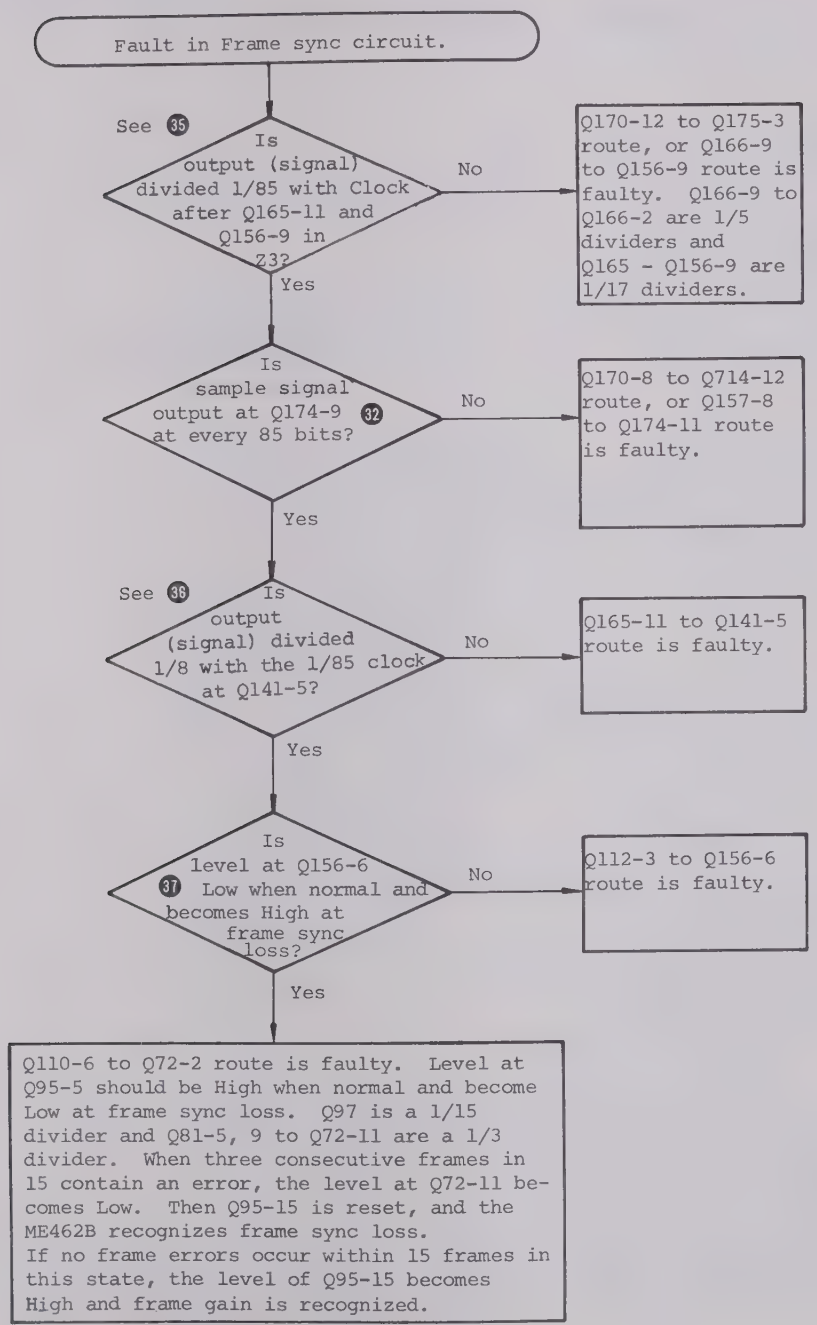

Fault in Frame sync circuit.
See 35
Is output (signal) divided 1/85 with Clock after Q165-11 and Q156-9 in Z3?
No
Q170-12 to Q175-3 route, or Q166-9 to Q156-9 route is faulty. Q166-9 to Q166-2 are 1/5 dividers and Q165 - Q156-9 are 1/17 dividers.
Yes
Is sample signal output at Q174-9 32 at every 85 bits?
No
Q170-8 to Q714-12 route, or Q157-8 to Q174-11 route is faulty.
Yes
See 38
Is output (signal) divided 1/8 with the 1/85 clock at Q141-5?
No
Q165-11 to Q141-5 route is faulty.
Yes
Is level at Q156-6 37 Low when normal and becomes High at frame sync loss?
No
Q112-3 to Q156-6 route is faulty.
Yes
Q110-6 to Q72-2 route is faulty. Level at Q95-5 should be High when normal and become Low at frame sync loss. Q97 is a 1/15 divider and Q81-5, 9 to Q72-11 are a 1/3 divider. When three consecutive frames in 15 contain an error, the level at Q72-11 becomes Low. Then Q95-15 is reset, and the ME462B recognizes frame sync loss.
If no frame errors occur within 15 frames in this state, the level of Q95-15 becomes High and frame gain is recognized.

Fig. 3-43 Frame Sync Circuit Troubleshooting Flowchart

3.3.9 Error Detector Troubleshooting

Refer to
- [4] Power Supply Circuit (Z2): 43W30644 (3/5, 4/5)
- [12] Bit Error Detector (Z3): 43W30648 (4/10, 6/10, 7/10, 9/10, 10/10)

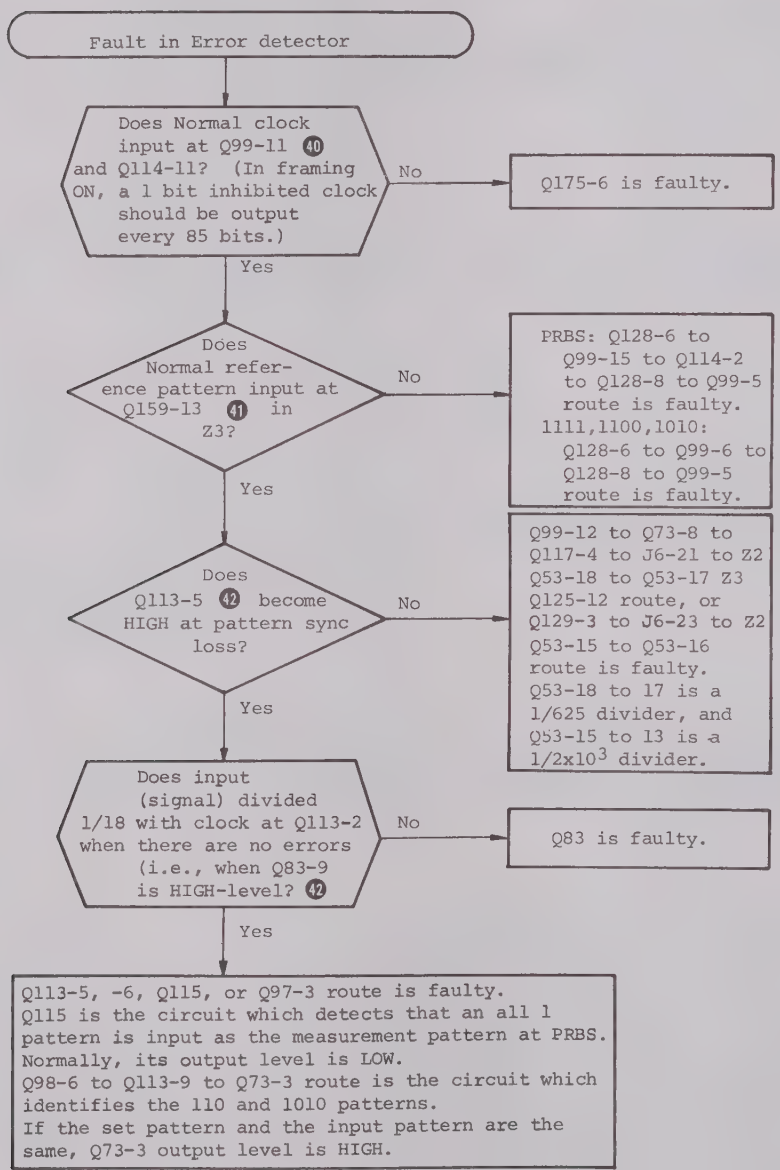

Fault in Error detector
Does Normal clock input at Q99-11 (40) and Q114-11? (In framing ON, a 1 bit inhibited clock should be output every 85 bits.)
No
Q175-6 is faulty.
Yes
Does Normal reference pattern input at Q159-13 (41) in Z3?
No
PRBS: Q128-6 to Q99-15 to Q114-2 to Q128-8 to Q99-5 route is faulty.
1111,1100,1010: Q128-6 to Q99-6 to Q128-8 to Q99-5 route is faulty.
Yes
Does Q113-5 (42) become HIGH at pattern sync loss?
No
Q99-12 to Q73-8 to Q117-4 to J6-21 to Z2 Q53-18 to Q53-17 Z3 Q125-12 route, or Q129-3 to J6-23 to Z2 Q53-15 to Q53-16 route is faulty. Q53-18 to 17 is a 1/625 divider, and Q53-15 to 13 is a 1/2x10^3 divider.
Yes
Does input (signal) divided 1/18 with clock at Q113-2 when there are no errors (i.e., when Q83-9 is HIGH-level? (42)
No
Q83 is faulty.
Yes
Q113-5, -6, Q115, or Q97-3 route is faulty.
Q115 is the circuit which detects that an all 1 pattern is input as the measurement pattern at PRBS. Normally, its output level is LOW.
Q98-6 to Q113-9 to Q73-3 route is the circuit which identifies the 110 and 1010 patterns.
If the set pattern and the input pattern are the same, Q73-3 output level is HIGH.

Fig. 3-44 Error Detector Troubleshooting Flowchart

3.3.10 Counter Circuit Troubleshooting

(1) Bit Error Counter

Refer to
- 11 Control Circuit (Z2): 43W30649 (1/5, 4/5)
- 12 Bit Error Detector (Z3): 43W30648 (7/10, 10/10)

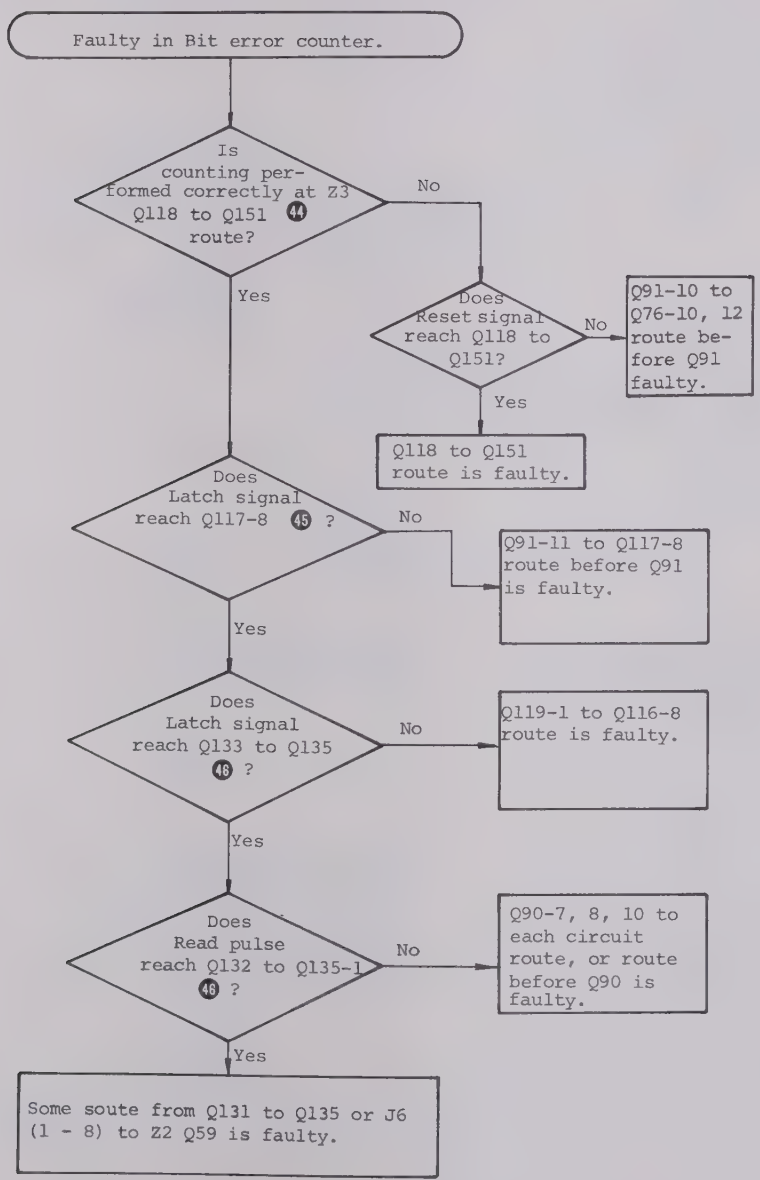

Faulty in Bit error counter.
Is counting performed correctly at Z3 Q118 to Q151 route? 44
No
Yes
Does Reset signal reach Q118 to Q151?
No
Q91-10 to Q76-10, 12 route before Q91 faulty.
Yes
Q118 to Q151 route is faulty.
Does Latch signal reach Q117-8 45 ?
No
Q91-11 to Q117-8 route before Q91 is faulty.
Yes
Does Latch signal reach Q133 to Q135 46 ?
No
Q119-1 to Q116-8 route is faulty.
Yes
Does Read pulse reach Q132 to Q135-1 46 ?
No
Q90-7, 8, 10 to each circuit route, or route before Q90 is faulty.
Yes
Some soute from Q131 to Q135 or J6 (1 - 8) to Z2 Q59 is faulty.

Fig. 3-45 Counter Circuit Troubleshooting Flowchart

(2) Bipolar Violation Counter

Refer to
- 11 Control Circuit (Z2): 43W30649 (1/5, 4/5)
- 12 Bit Error Detector (Z3): 43W30648 (8/10, 10/10)

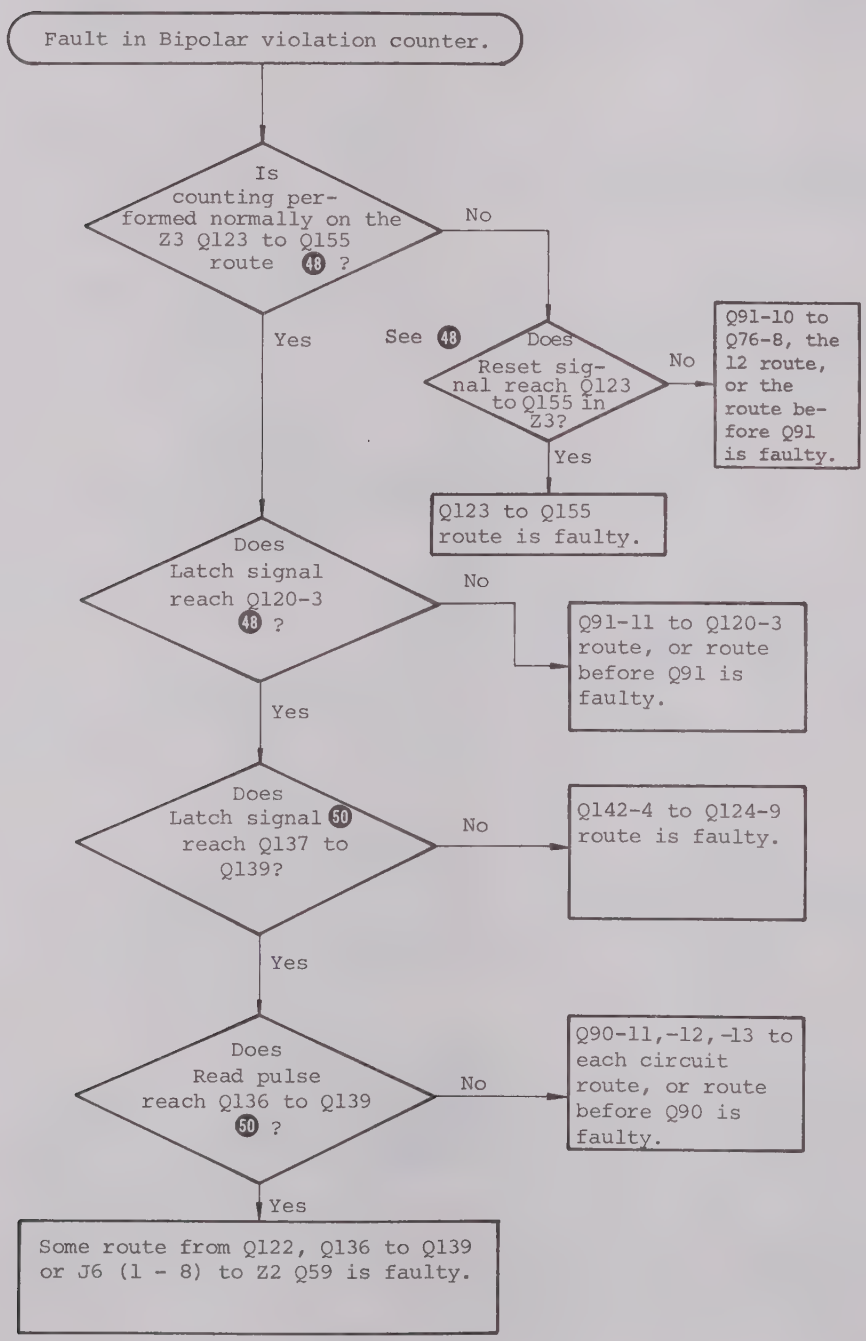

Fault in Bipolar violation counter.
Is counting performed normally on the Z3 Q123 to Q155 route 48 ?
No
Yes
See 48
Does Reset signal reach Q123 to Q155 in Z3?
No
Q91-10 to Q76-8, the 12 route, or the route before Q91 is faulty.
Yes
Q123 to Q155 route is faulty.
Does Latch signal reach Q120-3 48 ?
No
Q91-11 to Q120-3 route, or route before Q91 is faulty.
Yes
Does Latch signal 50 reach Q137 to Q139?
No
Q142-4 to Q124-9 route is faulty.
Yes
Does Read pulse reach Q136 to Q139 50 ?
No
Q90-11,-12,-13 to each circuit route, or route before Q90 is faulty.
Yes
Some route from Q122, Q136 to Q139 or J6 (1 - 8) to Z2 Q59 is faulty.

Fig. 3-46 Bipolar Violation Counter Troubleshooting Flowchart

(3) Parity Error Counter

Refer to
- 11 Control Circuit (Z2): 43W30649 (1/5, 4/5)
- 12 Bit Error Detector (Z3): 43W30648 (9/10, 10/10)

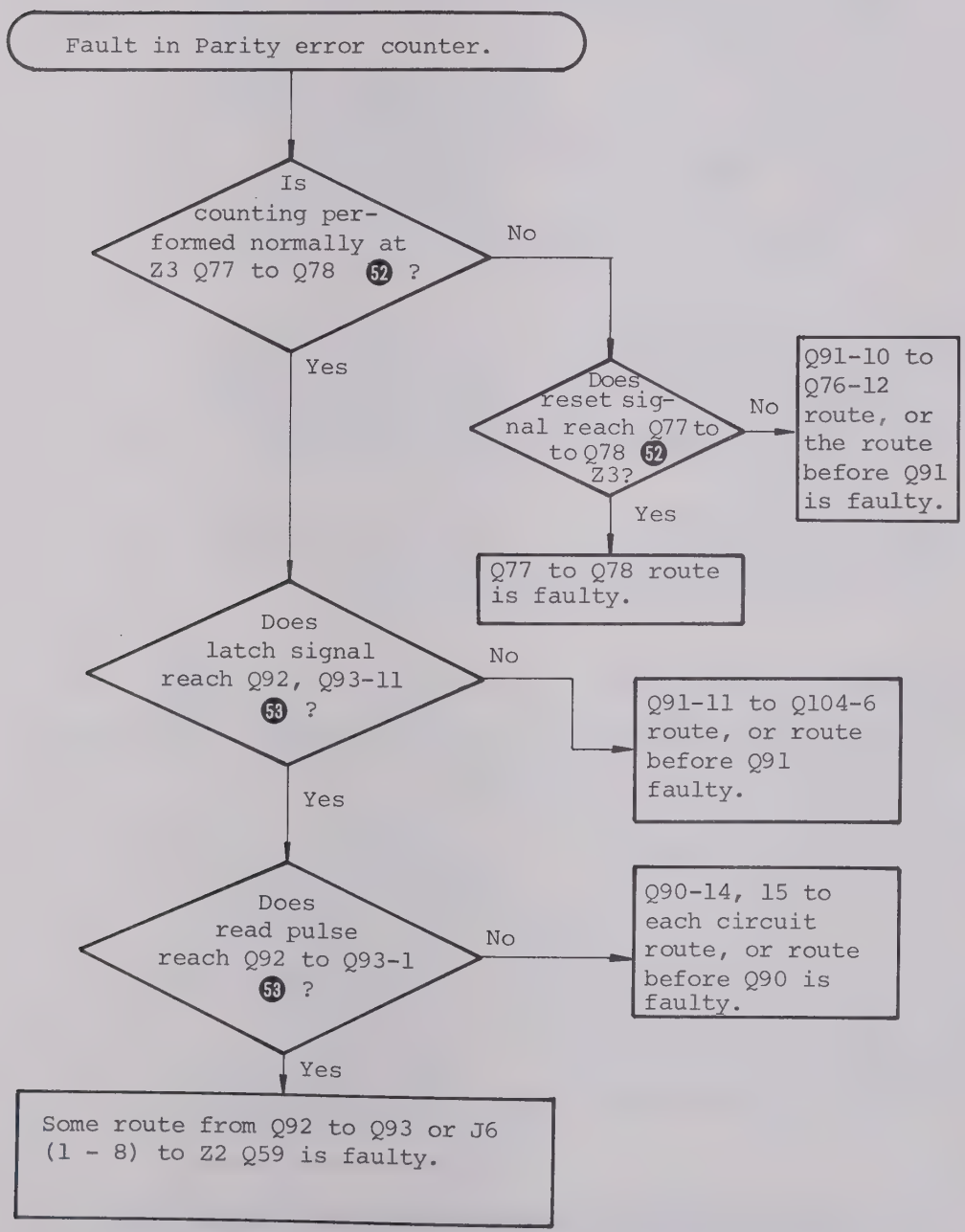

Fault in Parity error counter.
Is counting performed normally at Z3 Q77 to Q78 52 ?
No
Yes
Does reset signal reach Q77 to to Q78 52 Z3?
No
Q91-10 to Q76-12 route, or the route before Q91 is faulty.
Yes
Q77 to Q78 route is faulty.
Does latch signal reach Q92, Q93-11 53 ?
No
Q91-11 to Q104-6 route, or route before Q91 faulty.
Yes
Does read pulse reach Q92 to Q93-1 53 ?
No
Q90-14, 15 to each circuit route, or route before Q90 is faulty.
Yes
Some route from Q92 to Q93 or J6 (1 - 8) to Z2 Q59 is faulty.

Fig. 3-47 Parity Error Counter Troubleshooting Flowchart

3.3.11 Error Seconds (ES) or Error Free Seconds (EFS) Circuit Troubleshooting

Refer to
- [11] Control Circuit (Z2): 43W30749 (1/5, 3/5, 5/5)
- [12] Bit Error Detector (Z3): 43W30848 (7/10 to 10/10)

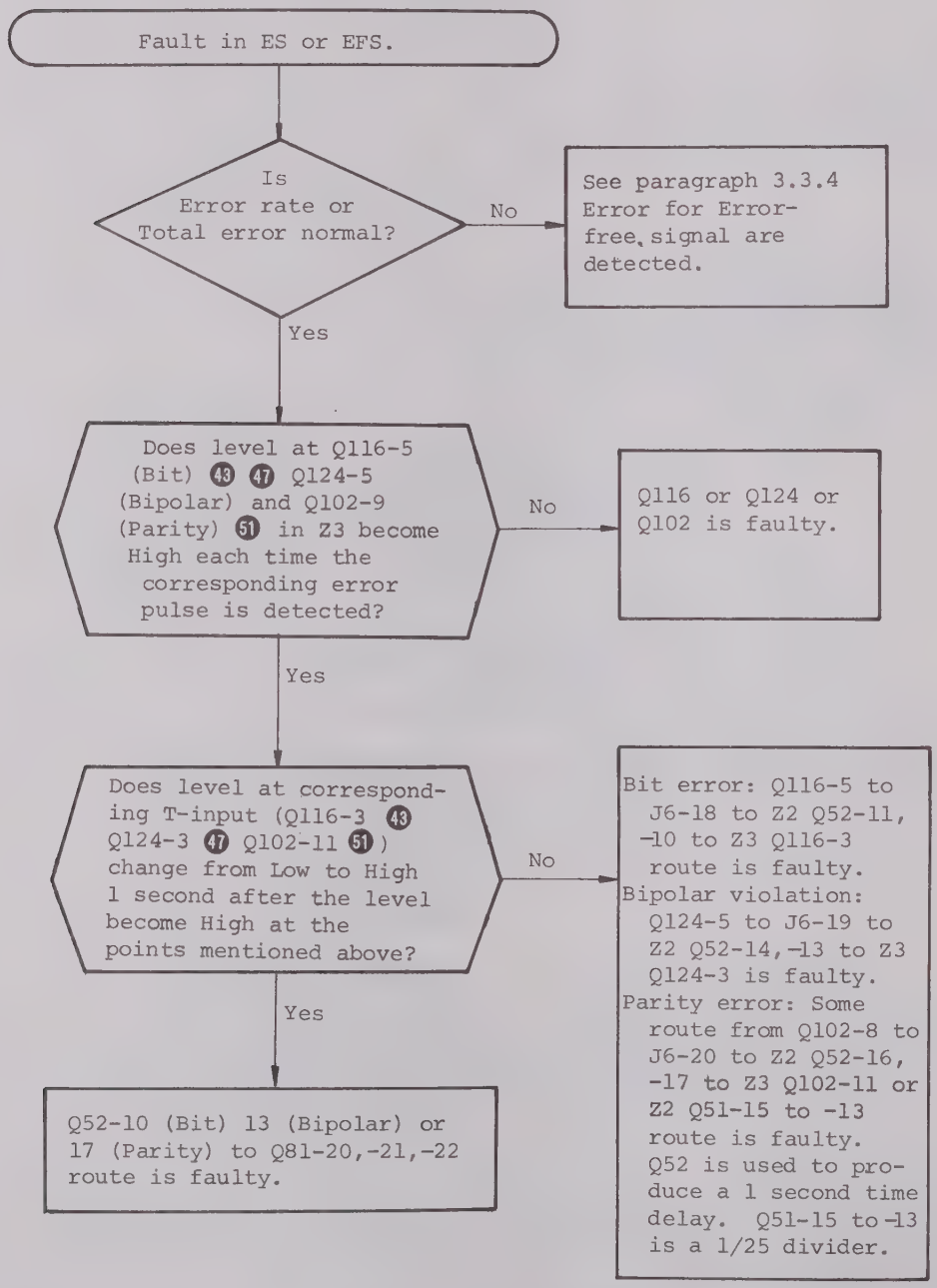

Fault in ES or EFS.
Is Error rate or Total error normal?
No
See paragraph 3.3.4 Error for Error-free signal are detected.
Yes
Does level at Q116-5 (Bit) 43 47 Q124-5 (Bipolar) and Q102-9 (Parity) 51 in Z3 become High each time the corresponding error pulse is detected?
No
Q116 or Q124 or Q102 is faulty.
Yes
Does level at corresponding T-input (Q116-3 43 Q124-3 47 Q102-11 51) change from Low to High 1 second after the level become High at the points mentioned above?
No
Bit error: Q116-5 to J6-18 to Z2 Q52-11, -10 to Z3 Q116-3 route is faulty.
Bipolar violation: Q124-5 to J6-19 to Z2 Q52-14, -13 to Z3 Q124-3 is faulty.
Parity error: Some route from Q102-8 to J6-20 to Z2 Q52-16, -17 to Z3 Q102-11 or Z2 Q51-15 to -13 route is faulty.
Q52 is used to produce a 1 second time delay. Q51-15 to -13 is a 1/25 divider.
Yes
Q52-10 (Bit) 13 (Bipolar) or 17 (Parity) to Q81-20, -21, -22 route is faulty.

Fig. 3-48 Error Second (ES) or Error Free Second (EFS) Troubleshooting Flowchart

3.3.12 Alarm Display or Buzzer Sound Circuit Troubleshooting

When the circuit is normal at the lamps below, check the associated LED or its peripheral circuit.

(1) AC POWER FAILURE Lamp

Refer to
- 10 Overall Circuit of Receiver: 43W30647 (1/1)
- 11 Control Circuit (Z2) : 43W30649 (1/5, 5/5)

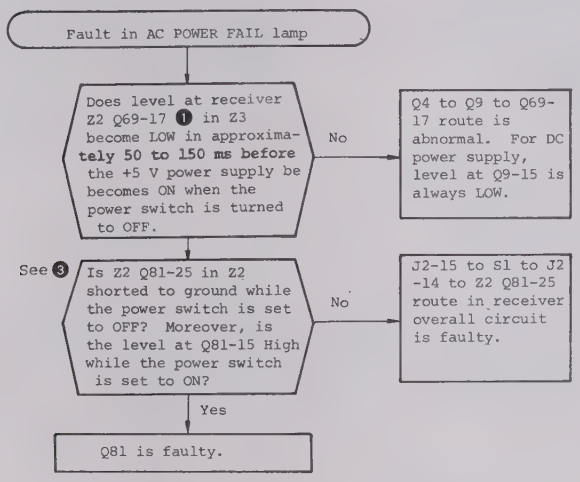

Fault in AC POWER FAIL lamp
Does level at receiver Z2 Q69-17 ❶ in Z3 become LOW in approximately 50 to 150 ms before the +5 V power supply be becomes ON when the power switch is turned to OFF.
No
Q4 to Q9 to Q69-17 route is abnormal. For DC power supply, level at Q9-15 is always LOW.
See ❸
Is Z2 Q81-25 in Z2 shorted to ground while the power switch is set to OFF? Moreover, is the level at Q81-15 High while the power switch is set to ON?
No
J2-15 to S1 to J2-14 to Z2 Q81-25 route in receiver overall circuit is faulty.
Yes
Q81 is faulty.

Fig. 3-49 Alarm Display (AC POWER FAILURE Lamp) Troubleshooting Flowchart

(2) SIGNAL LOSS Lamp

Refer to 12 Bit Error Detector (Z3): 43W30648 (4/10, 10/10)

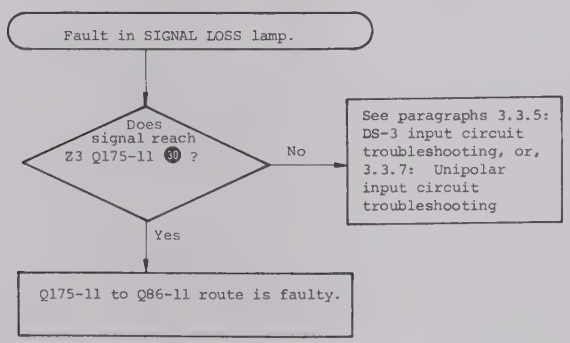

Fault in SIGNAL LOSS lamp.
Does signal reach Z3 Q175-11 ㉚ ?
No
See paragraphs 3.3.5: DS-3 input circuit troubleshooting, or, 3.3.7: Unipolar input circuit troubleshooting
Yes
Q175-11 to Q86-11 route is faulty.

Fig. 3-50 Alarm Display (SIGNAL LOSS Lamp) Troubleshooting Flowchart

(3) FRAME LOSS Lamp

Refer to 12 Bit Error Detector (Z3): 43W30648 (5/10, 10/10)

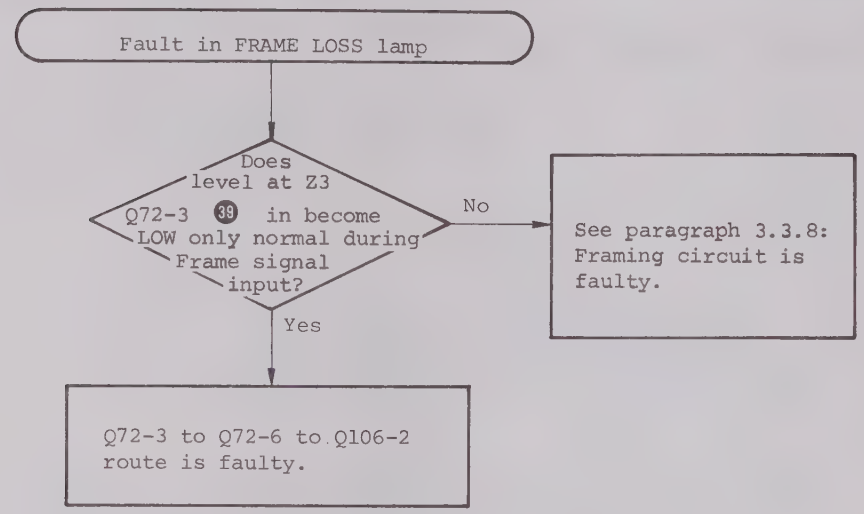

Fault in FRAME LOSS lamp
Does level at Z3 Q72-3 39 in become LOW only normal during Frame signal input?
No
See paragraph 3.3.8: Framing circuit is faulty.
Yes
Q72-3 to Q72-6 to Q106-2 route is faulty.

Fig. 3-51 Alarm Display (FRAME LOSS Lamp) Troubleshooting Flowchart

(4) PATTERN SYNC LOSS Lamp

Refer to 12 Bit Error Detector (Z3): 43W30648 (6/10, 10/10)

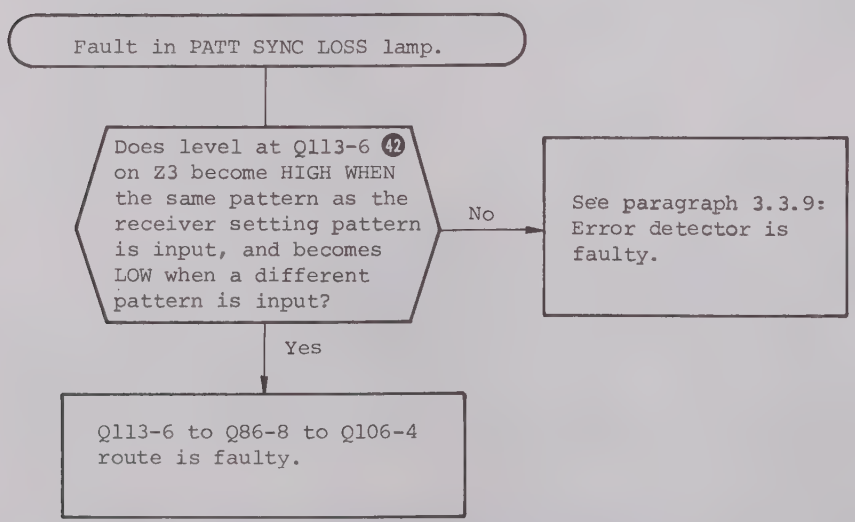

Fault in PATT SYNC LOSS lamp.
Does level at Q113-6 42 on Z3 become HIGH WHEN the same pattern as the receiver setting pattern is input, and becomes LOW when a different pattern is input?
No
See paragraph 3.3.9: Error detector is faulty.
Yes
Q113-6 to Q86-8 to Q106-4 route is faulty.

Fig. 3-52 Alarm Display (PATTERN SYNC LOSS) Troubleshooting Flowchart

(5) BLUE SIGNAL Lamp

Refer to [12] Bit Error Detector (Z3): 43W30648 (4/10, 10/10)

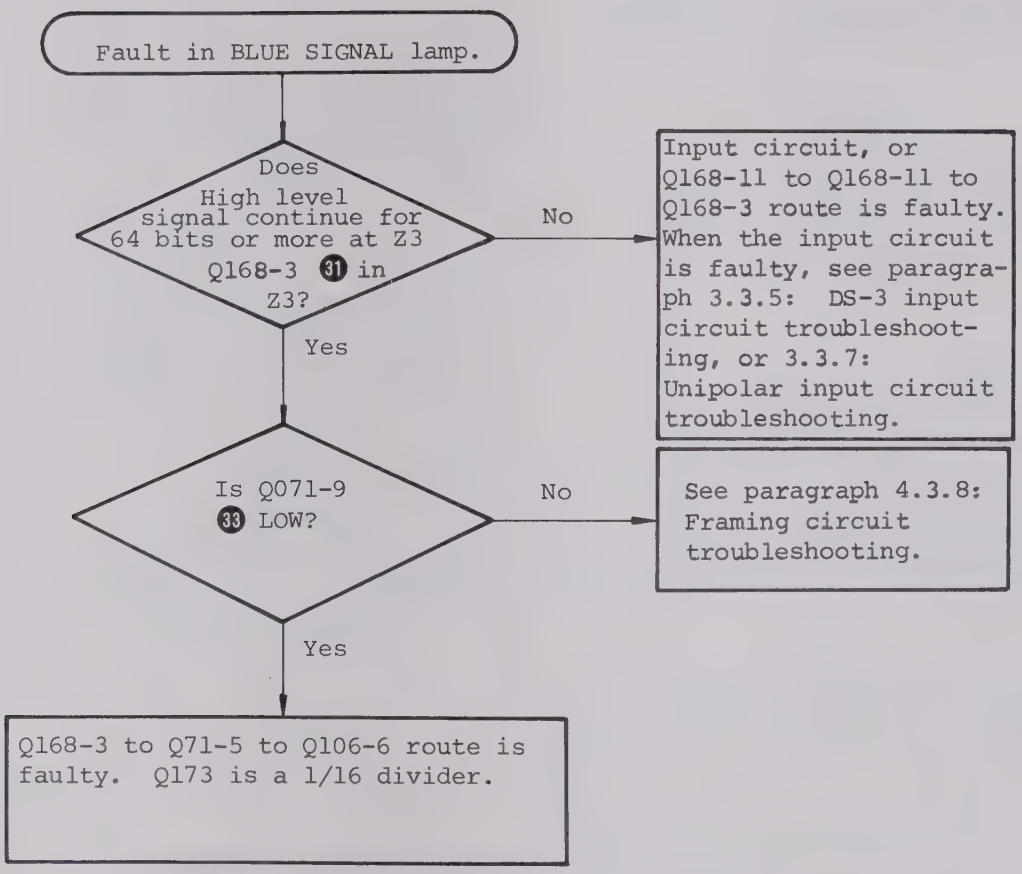

Fault in BLUE SIGNAL lamp.
Does High level signal continue for 64 bits or more at Z3 Q168-3 31 in Z3?
No
Input circuit, or Q168-11 to Q168-11 to Q168-3 route is faulty. When the input circuit is faulty, see paragraph 3.3.5: DS-3 input circuit troubleshooting, or 3.3.7: Unipolar input circuit troubleshooting.
Yes
Is Q071-9 33 LOW?
No
See paragraph 4.3.8: Framing circuit troubleshooting.
Yes
Q168-3 to Q71-5 to Q106-6 route is faulty. Q173 is a 1/16 divider.

Fig. 3-53 Alarm Display (BLUE SIGNAL Lamp) Troubleshooting Flowchart

(6) Error Lamp

Refer to 12 Bit Error Detector (Z3): 43W30648 (7/10, 10/10)

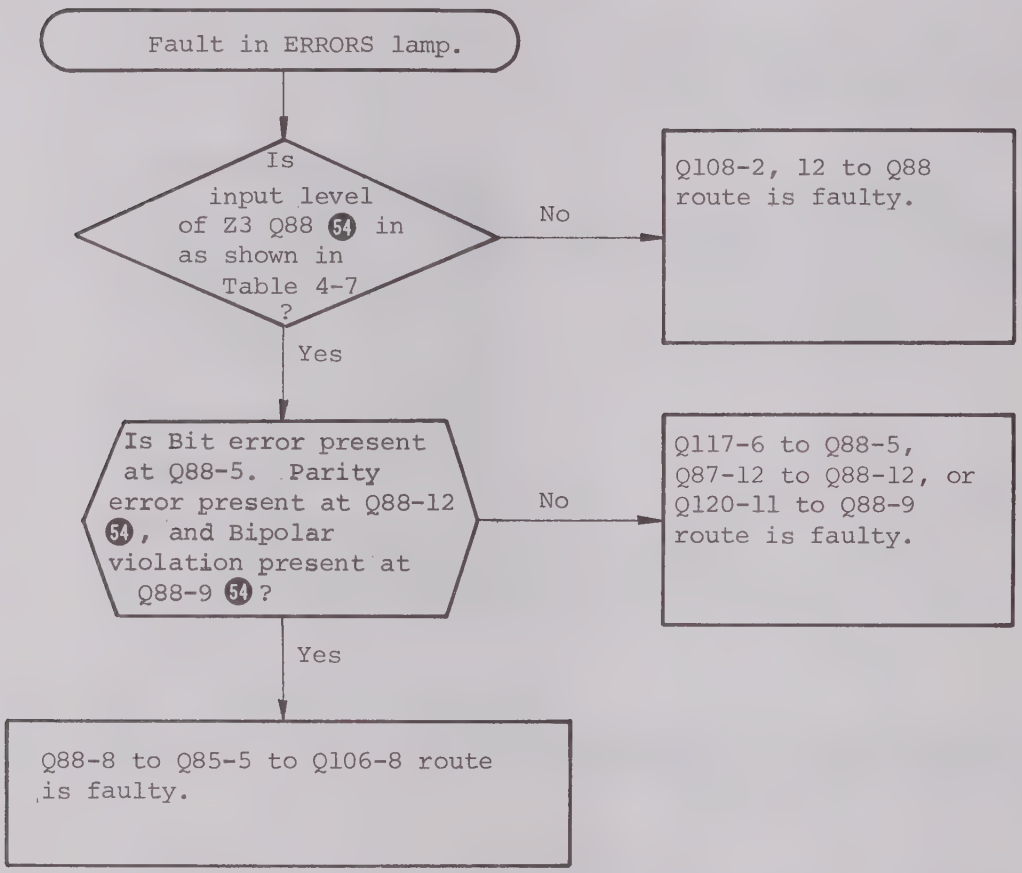

Fault in ERRORS lamp.
Is input level of Z3 Q88 54 in as shown in Table 4-7 ?
No
Q108-2, 12 to Q88 route is faulty.
Yes
Is Bit error present at Q88-5. Parity error present at Q88-12 54, and Bipolar violation present at Q88-9 54 ?
No
Q117-6 to Q88-5, Q87-12 to Q88-12, or Q120-11 to Q88-9 route is faulty.
Yes
Q88-8 to Q85-5 to Q106-8 route is faulty.

Fig. 3-54 Alarm Display (ERROR Lamp Blinking) Troubleshooting Flowchart

Table 3-7 Q88 Input Level

Pin Number	Error Setting		
	BIT	PARITY	BIPOLAR V
Q88 - 6	High	Low	High
Q88 - 4	High	High	Low
Q88 - 10	Low	Low	High
Q88 - 1	Low	High	Low
Q88 - 11	High	High	Low

(7) Buzzer

Refer to [12] Bit Error Detector (Z3): 43W30648 (9/10, 10/10)

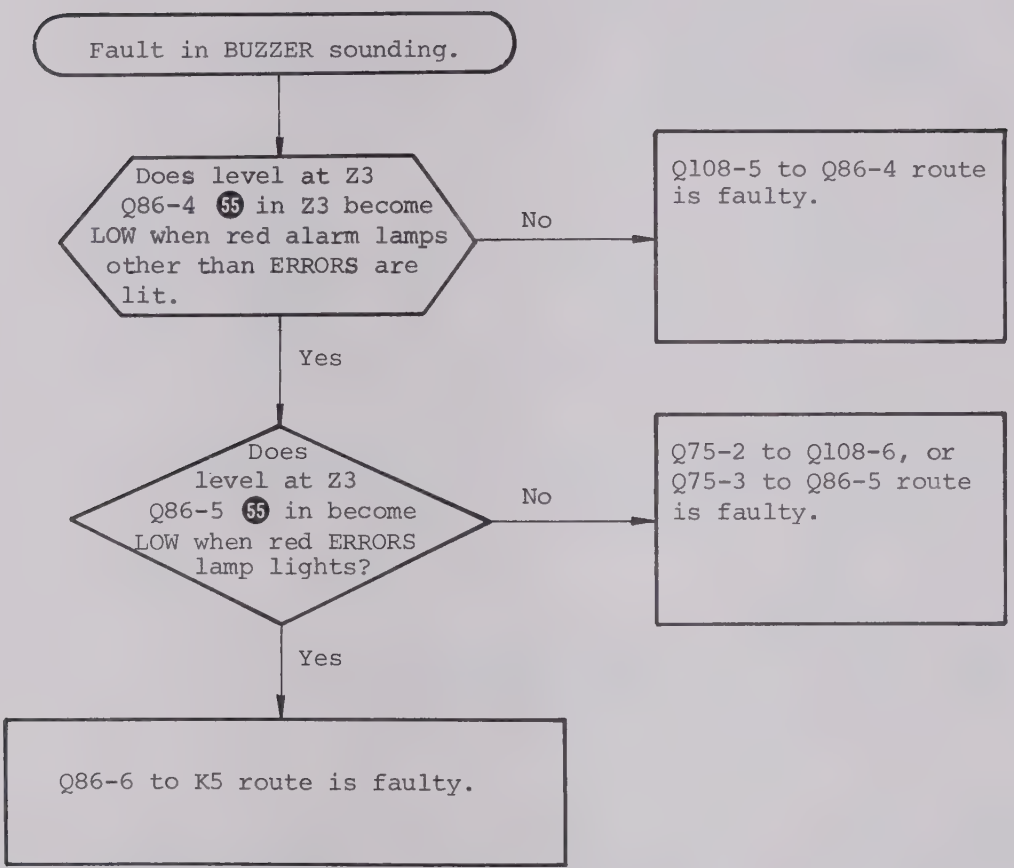

Fault in BUZZER sounding.
Does level at Z3 Q86-4 55 in Z3 become LOW when red alarm lamps other than ERRORS are lit.
No
Q108-5 to Q86-4 route is faulty.
Yes
Does level at Z3 Q86-5 55 in become LOW when red ERRORS lamp lights?
No
Q75-2 to Q108-6, or Q75-3 to Q86-5 route is faulty.
Yes
Q86-6 to K5 route is faulty.

Fig. 3-55 Buzzer Sound Troubleshooting Flowchart

3.3.13 Measuring Time or Real-Time Circuit Troubleshooting

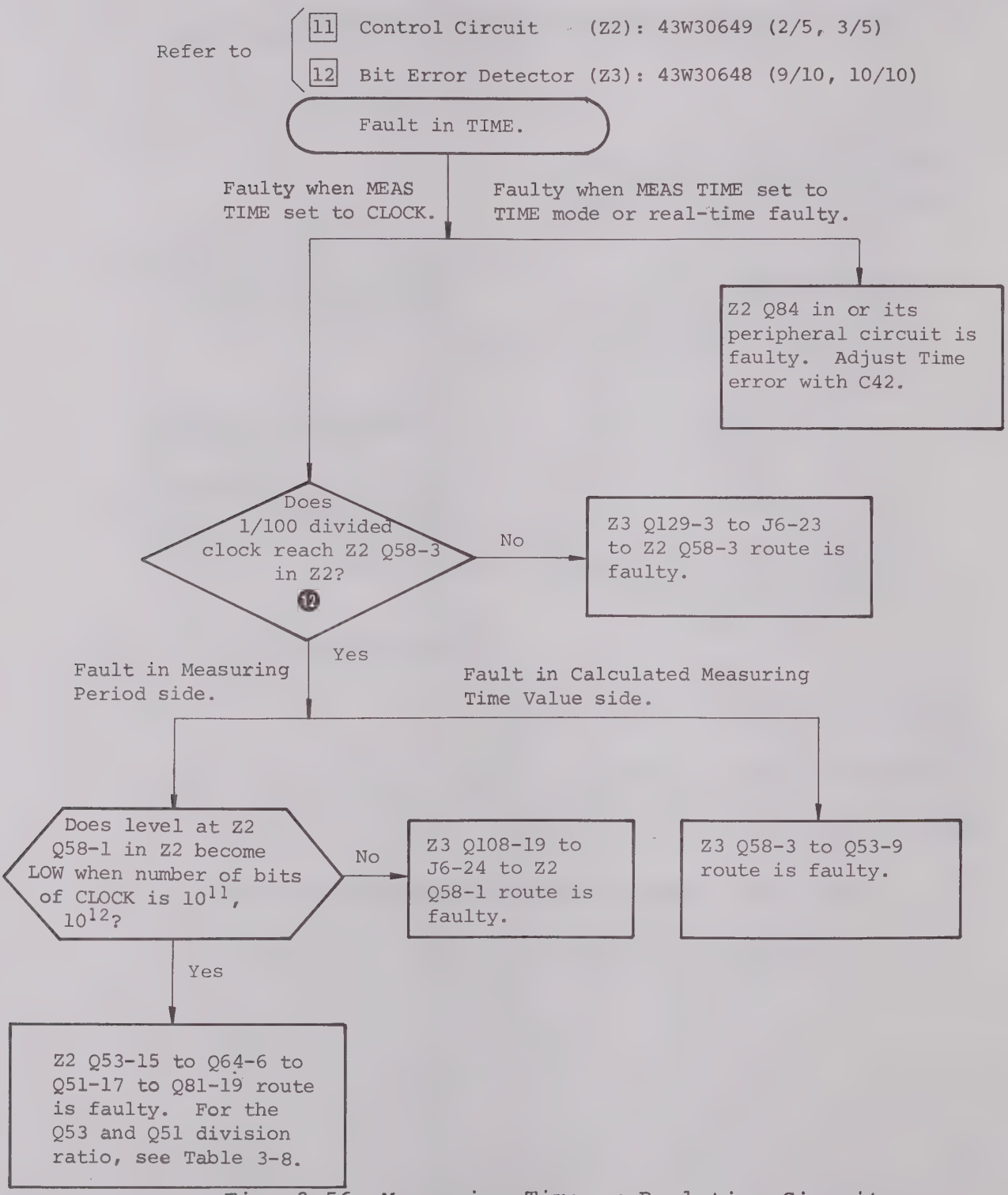

Refer to
11 Control Circuit (Z2): 43W30649 (2/5, 3/5)
12 Bit Error Detector (Z3): 43W30648 (9/10, 10/10)
Fault in TIME.
Faulty when MEAS TIME set to CLOCK.
Faulty when MEAS TIME set to TIME mode or real-time faulty.
Z2 Q84 in or its peripheral circuit is faulty. Adjust Time error with C42.
Does 1/100 divided clock reach Z2 Q58-3 in Z2?
12
No
Z3 Q129-3 to J6-23 to Z2 Q58-3 route is faulty.
Yes
Fault in Measuring Period side.
Fault in Calculated Measuring Time Value side.
Does level at Z2 Q58-1 in Z2 become LOW when number of bits of CLOCK is 10^{11}, 10^{12}?
No
Z3 Q108-19 to J6-24 to Z2 Q58-1 route is faulty.
Z3 Q58-3 to Q53-9 route is faulty.
Yes
Z2 Q53-15 to Q64-6 to Q51-17 to Q81-19 route is faulty. For the Q53 and Q51 division ratio, see Table 3-8.

Fig. 3-56 Measuring Time or Real-time Circuit Troubleshooting Flowchart

Table 3-8 Division Ratio

Number of bits of clock	Between Q53-15 to -13	Between Q51-18 to -17
10^7	2000	50
10^8	2000	500
10^9	2000	5000
10^{10}	2000	50000
10^{11}	2000	5000
10^{12}	2000	50000

3.3.14 OUTPUT (CLOCK SYNC, MULTIFRAME SYNC, X-BIT, ERROR) Circuit Troubleshooting

Refer to
- 10 Overall Circuit of Receiver: 43W30647 (1/1)
- 12 Bit Error Detector (Z3) : 43W30648 (3/10 to 6/10, 9/10)

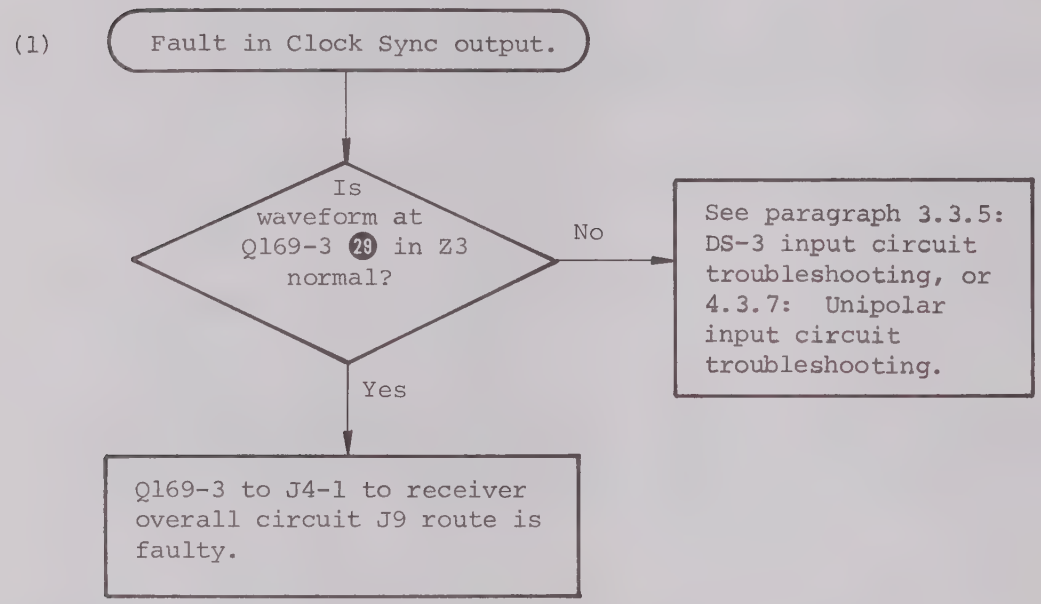

(1)
Fault in Clock Sync output.
Is waveform at Q169-3 29 in Z3 normal?
No
See paragraph 3.3.5: DS-3 input circuit troubleshooting, or 4.3.7: Unipolar input circuit troubleshooting.
Yes
Q169-3 to J4-1 to receiver overall circuit J9 route is faulty.

Fig. 3-57 Clock Sync Output Circuit Troubleshooting Flowchart

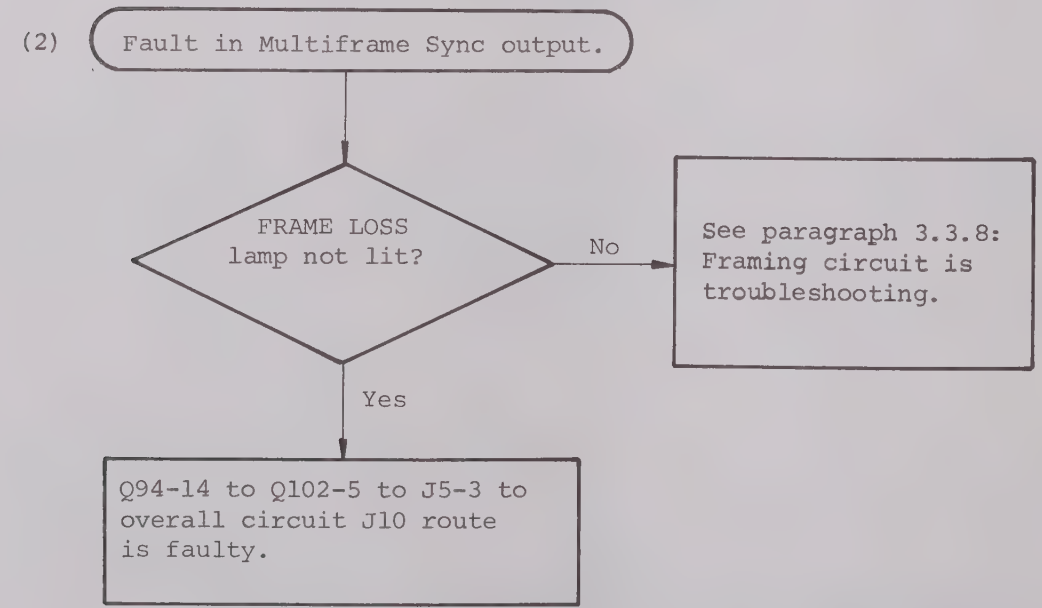

(2)
Fault in Multiframe Sync output.
FRAME LOSS lamp not lit?
No
See paragraph 3.3.8: Framing circuit is troubleshooting.
Yes
Q94-14 to Q102-5 to J5-3 to overall circuit J10 route is faulty.

Fig. 3-58 Multiframe Sync Output Circuit Troubleshooting Flowchart

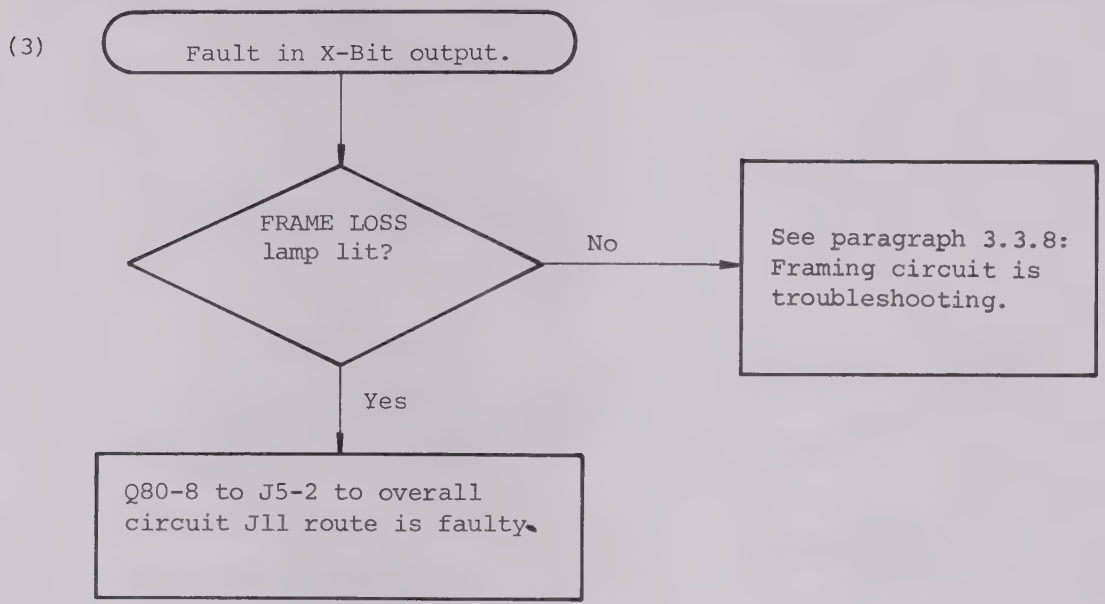

(3)
Fault in X-Bit output.
FRAME LOSS lamp lit?
No
See paragraph 3.3.8: Framing circuit is troubleshooting.
Yes
Q80-8 to J5-2 to overall circuit J11 route is faulty.

Fig. 3-59 X-Bit Output Circuit Troubleshooting Flowchart

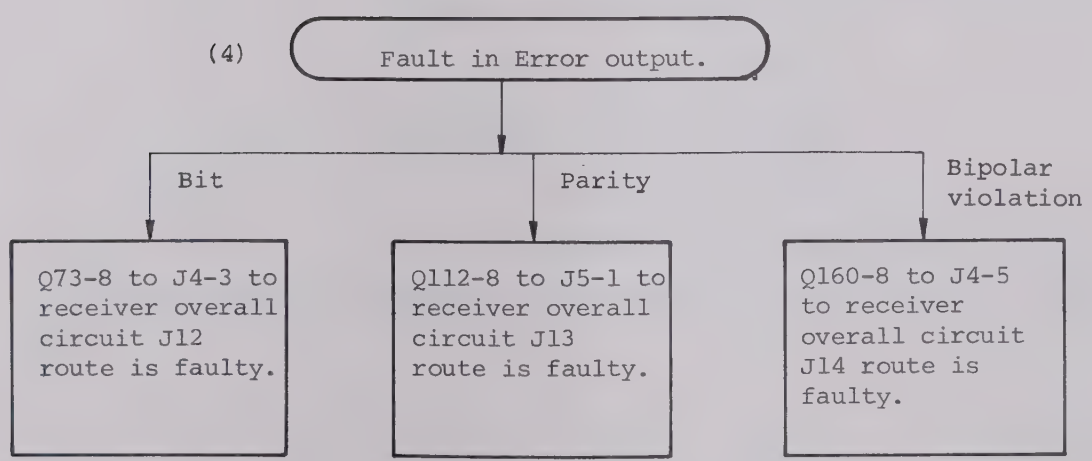

(4)
Fault in Error output.
Bit
Parity
Bipolar violation
Q73-8 to J4-3 to receiver overall circuit J12 route is faulty.
Q112-8 to J5-1 to receiver overall circuit J13 route is faulty.
Q160-8 to J4-5 to receiver overall circuit J14 route is faulty.

Fig. 3-60 X-Bit, Error Output Circuit Troubleshooting Flowchart

3.3.15 Monitor Input Circuit Troubleshooting

Refer to
- [10] Overall Circuit of Receiver: 43W30647 (1/1)
- [11] Control Circuit (Z2) : 43W30649 (1/5 to 4/5)
- [13] Front Panel Circuit (Z4) : 43W30650 (1/3)

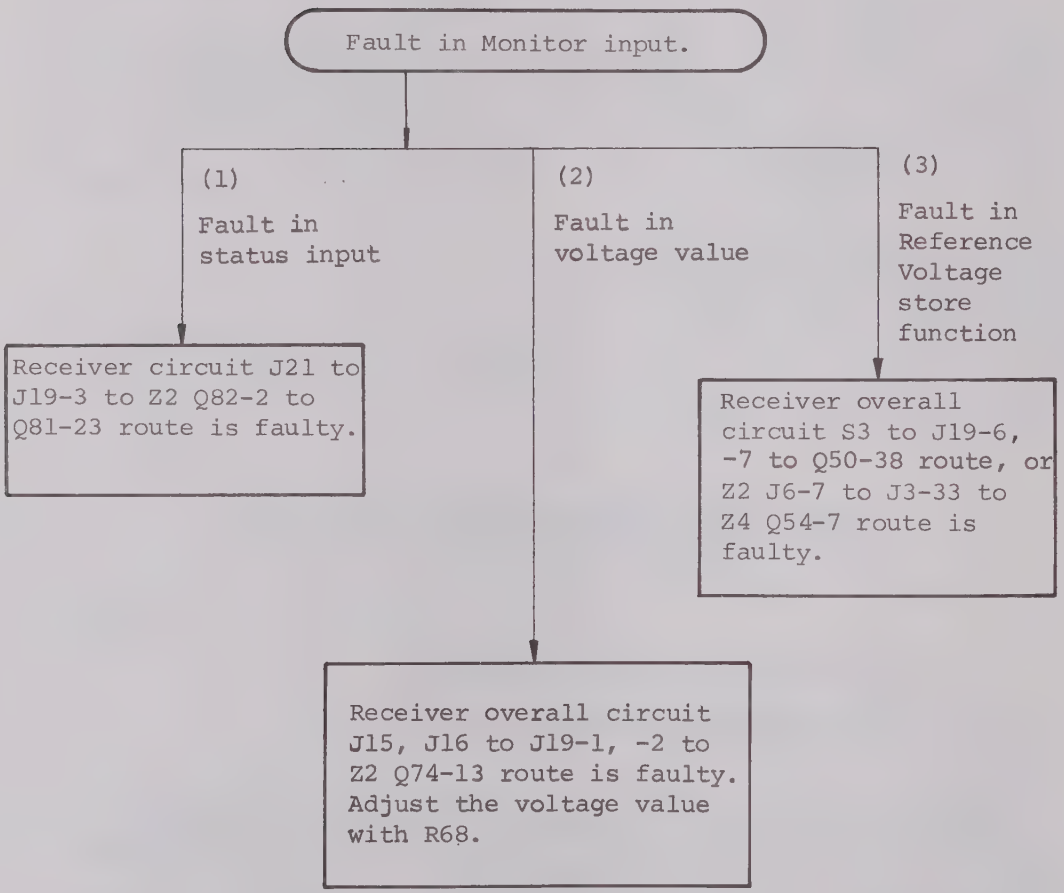

Fault in Monitor input.
(1)
Fault in status input
(2)
Fault in voltage value
(3)
Fault in Reference Voltage store function
Receiver circuit J21 to J19-3 to Z2 Q82-2 to Q81-23 route is faulty.
Receiver overall circuit S3 to J19-6, -7 to Q50-38 route, or Z2 J6-7 to J3-33 to Z4 Q54-7 route is faulty.
Receiver overall circuit J15, J16 to J19-1, -2 to Z2 Q74-13 route is faulty. Adjust the voltage value with R68.

Fig. 3-61 Monitor Input Circuit Troubleshooting Flowchart

3.3.16 Function Switch Troubleshooting

Refer to
- 10 Overall Circuit of Receiver: 43W30647 (1/1)
- 12 Bit Error Detector (Z3) : 43W30648 (10/10)

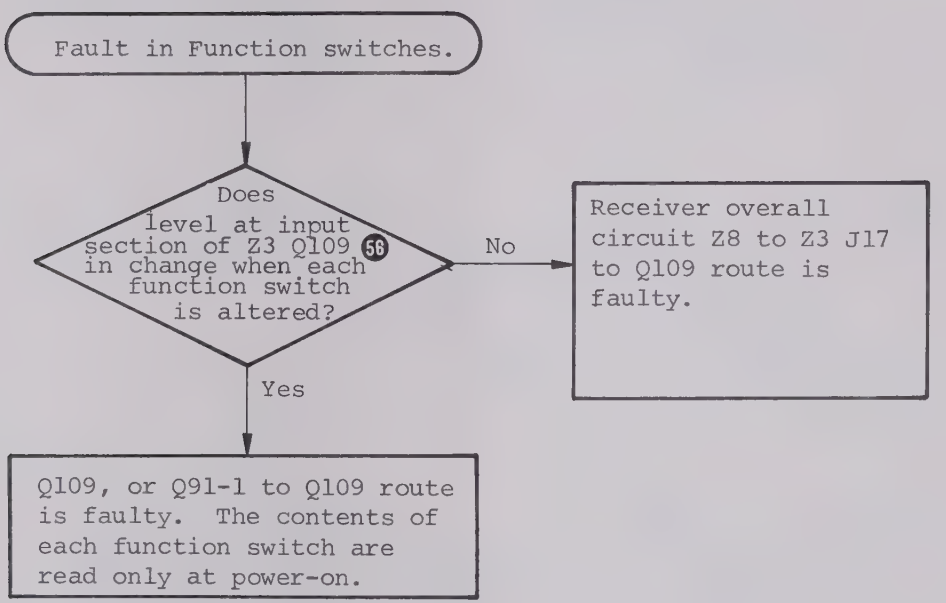
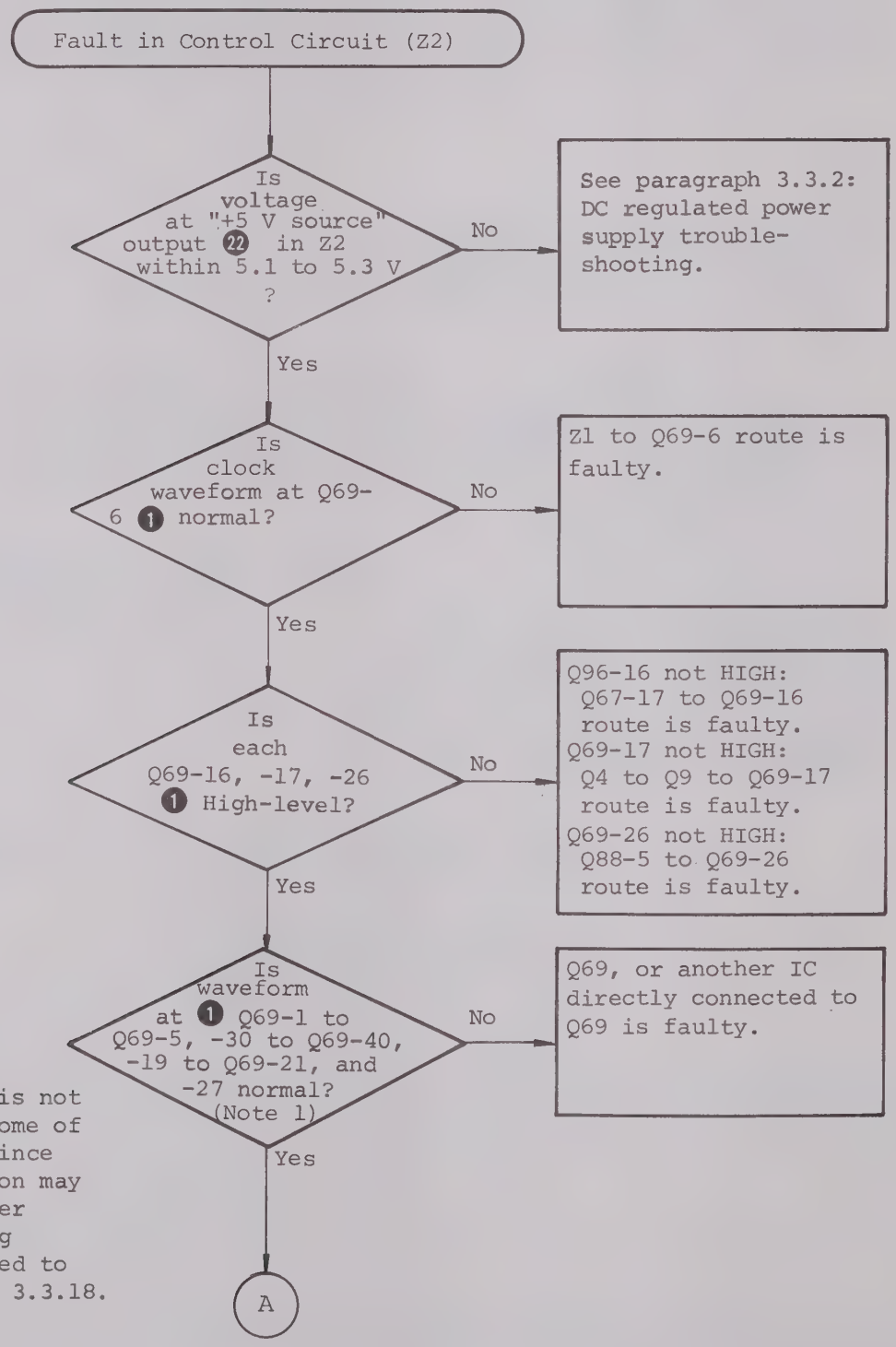

Fault in Function switches.
Does level at input section of Z3 Q109 56 in change when each function switch is altered?
No
Receiver overall circuit Z8 to Z3 J17 to Q109 route is faulty.
Yes
Q109, or Q91-1 to Q109 route is faulty. The contents of each function switch are read only at power-on.

Fig. 3-62 Function Switch Troubleshooting Flowchart

3.3.17 Control Circuit Troubleshooting

Refer to [11] Control Circuit (Z2): 43W30649 (1/5 to 5/5)


Fault in Control Circuit (Z2)
Is voltage at "+5 V source" output ㉒ in Z2 within 5.1 to 5.3 V ?
No
See paragraph 3.3.2: DC regulated power supply trouble-shooting.
Yes
Is clock waveform at Q69-6 ① normal?
No
Z1 to Q69-6 route is faulty.
Yes
Is each Q69-16, -17, -26 ① High-level?
No
Q96-16 not HIGH: Q67-17 to Q69-16 route is faulty.
Q69-17 not HIGH: Q4 to Q9 to Q69-17 route is faulty.
Q69-26 not HIGH: Q88-5 to Q69-26 route is faulty.
Yes
Is waveform at ① Q69-1 to Q69-5, -30 to Q69-40, -19 to Q69-21, and -27 normal? (Note 1)
No
Q69, or another IC directly connected to Q69 is faulty.
Yes
A

Note 1:

When a pulse is not output from some of these pins, since this phenomenon may caused by other circuits being faulty, proceed to the next flow 3.3.18.

Fig. 3-63 Control Circuit Troubleshooting Flowchart

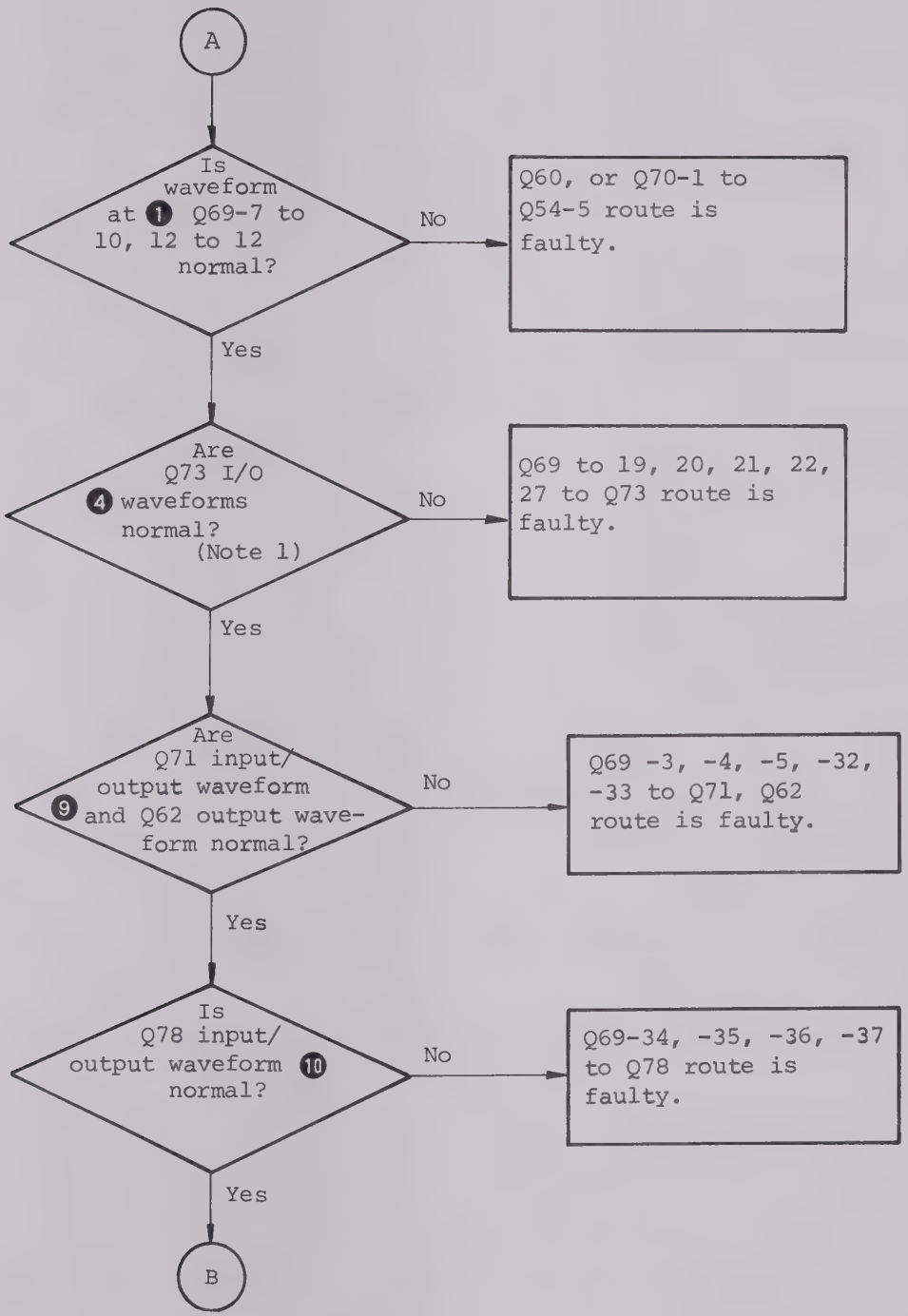

A
Is waveform at ❶ Q69-7 to 10, 12 to 12 normal?
No
Q60, or Q70-1 to Q54-5 route is faulty.
Yes
Are Q73 I/O ❹ waveforms normal? (Note 1)
No
Q69 to 19, 20, 21, 22, 27 to Q73 route is faulty.
Yes
Are Q71 input/ output waveform ❾ and Q62 output waveform normal?
No
Q69 -3, -4, -5, -32, -33 to Q71, Q62 route is faulty.
Yes
Is Q78 input/ output waveform ❿ normal?
No
Q69-34, -35, -36, -37 to Q78 route is faulty.
Yes
B

Fig. 3-63 (Cont.) Control Circuit Troubleshooting Flowchart

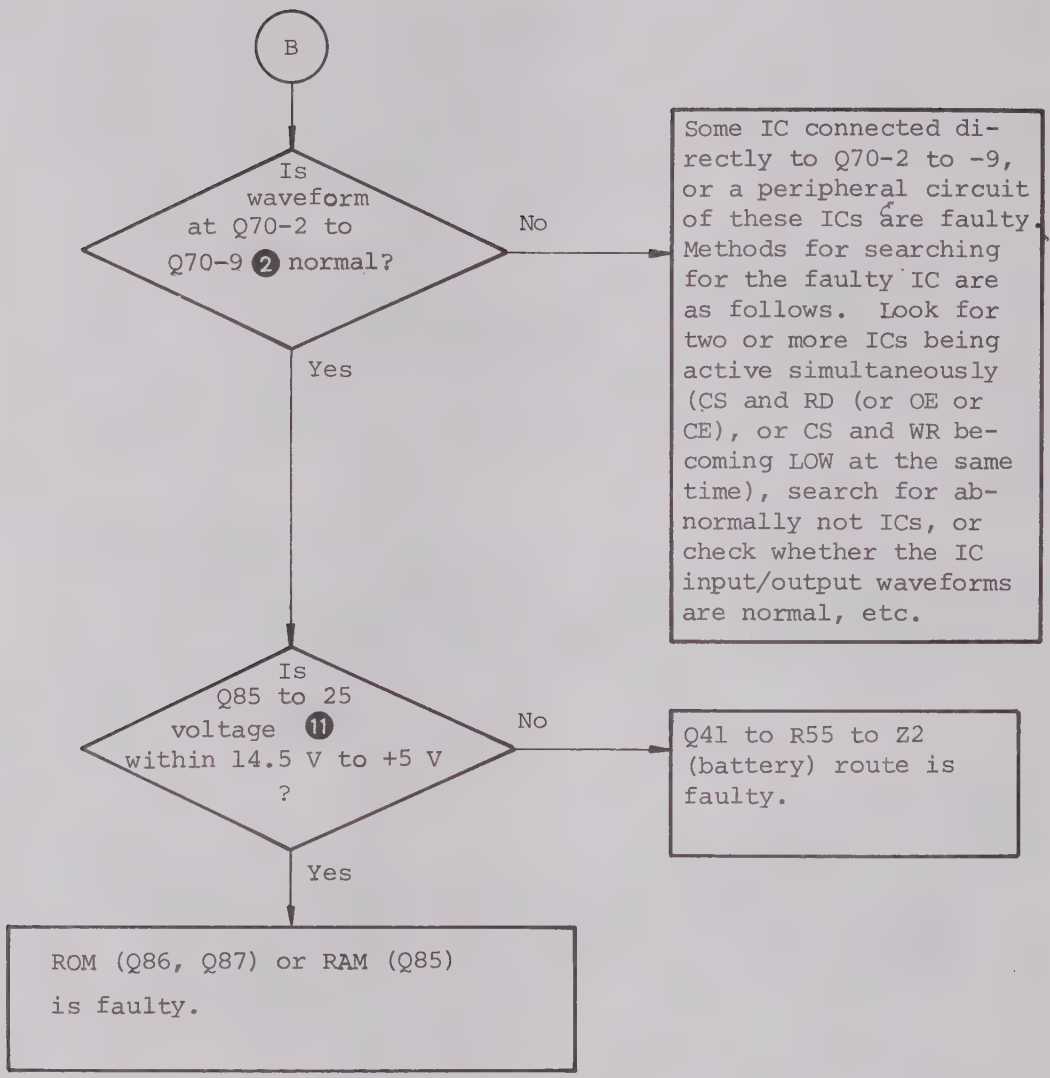

B
Is waveform at Q70-2 to Q70-9 ❷ normal?
No
Some IC connected directly to Q70-2 to -9, or a peripheral circuit of these ICs are faulty. Methods for searching for the faulty IC are as follows. Look for two or more ICs being active simultaneously (CS and RD (or OE or CE), or CS and WR becoming LOW at the same time), search for abnormally not ICs, or check whether the IC input/output waveforms are normal, etc.
Yes
Is Q85 to 25 voltage ⓫ within 14.5 V to +5 V ?
No
Q41 to R55 to Z2 (battery) route is faulty.
Yes
ROM (Q86, Q87) or RAM (Q85) is faulty.

Fig. 3-63 (Cont.) Control Circuit Troubleshooting Flowchart

3.3.18 Printer Troubleshooting

Refer to [11] Control Circuit (Z2) 43W30649 (1/5, 4/5)

The checks below can be made using the receiver only. Supply printing paper to the printer.

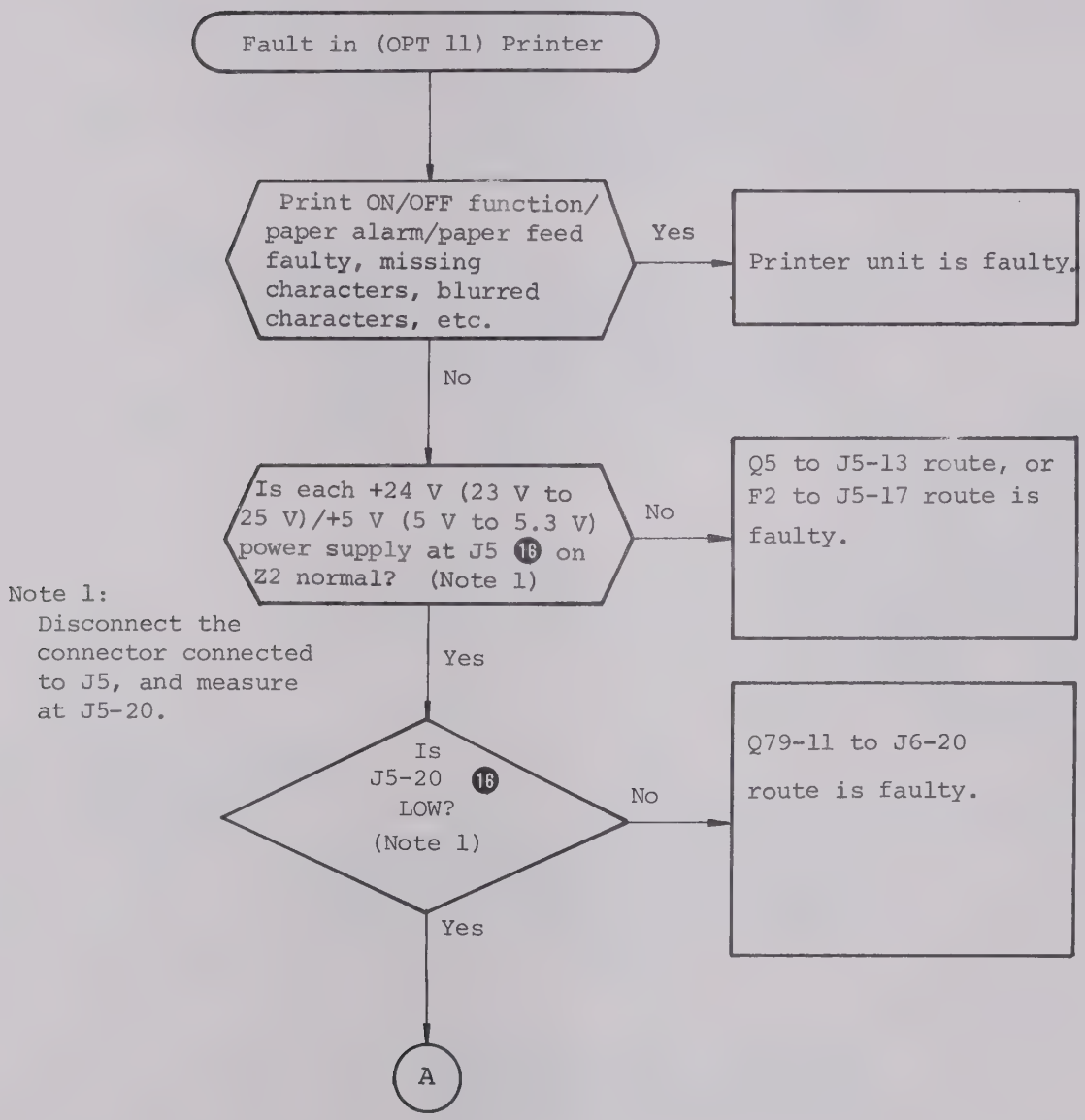

Fault in (OPT 11) Printer
Print ON/OFF function/ paper alarm/paper feed faulty, missing characters, blurred characters, etc.
Yes
Printer unit is faulty.
No
Is each +24 V (23 V to 25 V)/+5 V (5 V to 5.3 V) power supply at J5 ⑱ on Z2 normal? (Note 1)
No
Q5 to J5-13 route, or F2 to J5-17 route is faulty.
Note 1:
Disconnect the connector connected to J5, and measure at J5-20.
Yes
Is J5-20 ⑱ LOW? (Note 1)
No
Q79-11 to J6-20 route is faulty.
Yes
A

Fig. 3-64 Printer Troubleshooting Flowchart

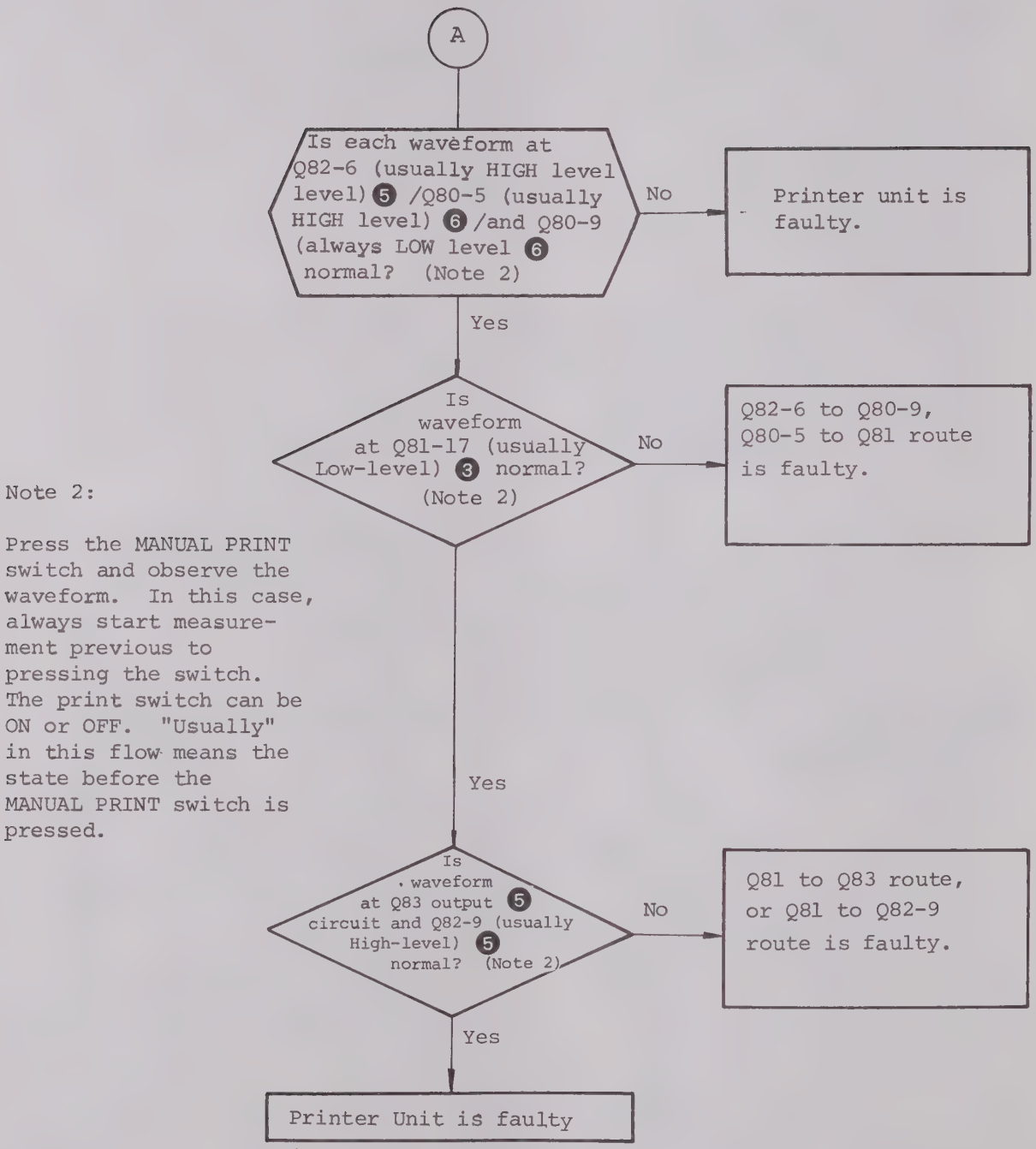

A
Is each waveform at Q82-6 (usually HIGH level level) 5 /Q80-5 (usually HIGH level) 6 /and Q80-9 (always LOW level 6 normal? (Note 2)
No
Printer unit is faulty.
Yes
Is waveform at Q81-17 (usually Low-level) 3 normal? (Note 2)
No
Q82-6 to Q80-9, Q80-5 to Q81 route is faulty.
Note 2:
Press the MANUAL PRINT switch and observe the waveform. In this case, always start measurement previous to pressing the switch. The print switch can be ON or OFF. "Usually" in this flow means the state before the MANUAL PRINT switch is pressed.
Yes
Is waveform at Q83 output 5 circuit and Q82-9 (usually High-level) 5 normal? (Note 2)
No
Q81 to Q83 route, or Q81 to Q82-9 route is faulty.
Yes
Printer Unit is faulty

Fig. 3-64 (Cont.) Printer Troubleshooting Flowchart

3.3.19 GP-IB or RS-232C Interface Troubleshooting

Refer to [11] Control Circuit (Z2): 43W30649 (1/5, 2/5, 4/5).

When making the checks below, connect the transmitter and receivers as shown in 2.5 Receiver Performance Check 2.5.2.4: "GP-IB interface check" of 4.5.25 "RS-232C interface check" of the Operation Manual, and check while executing the program.

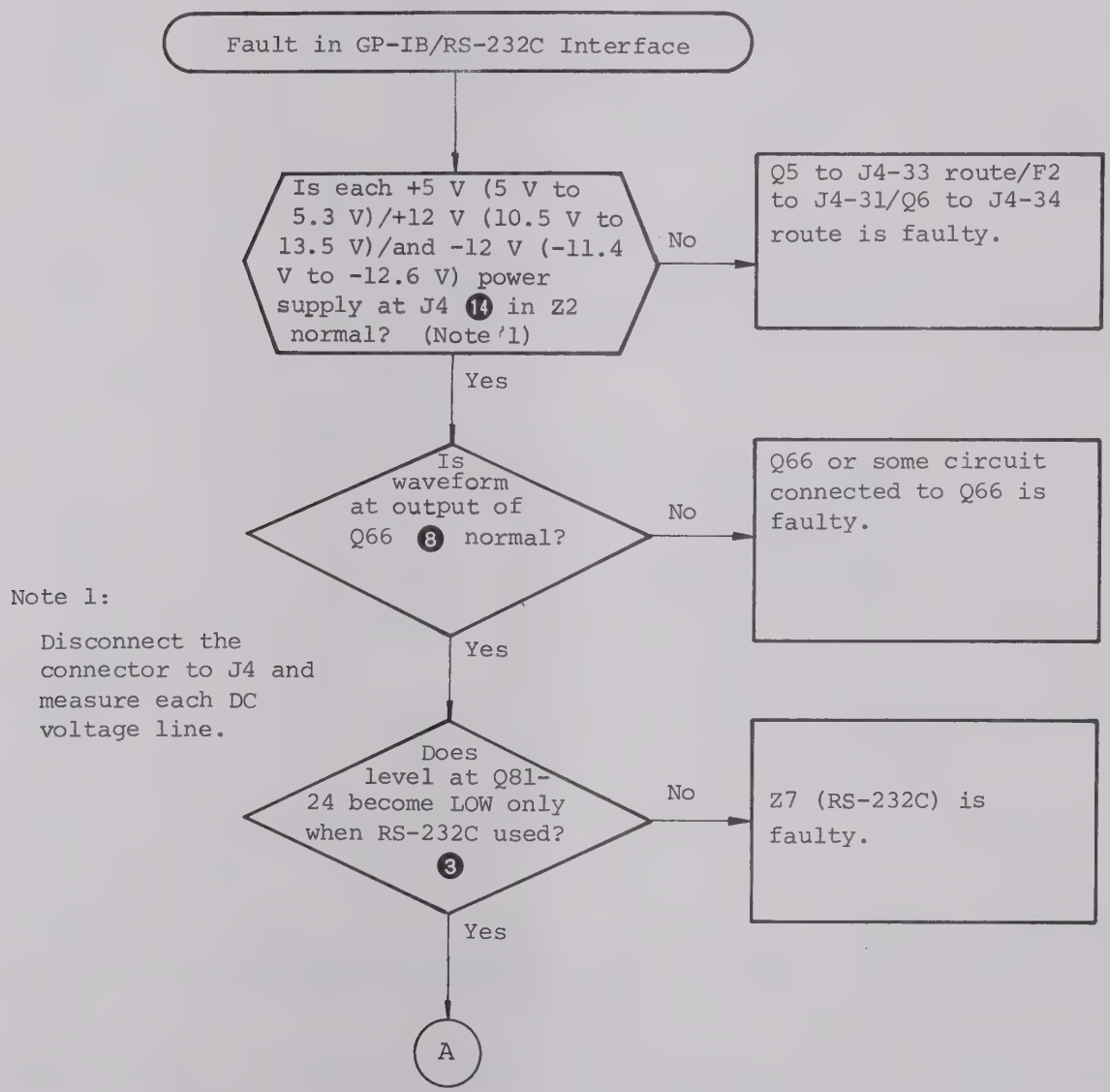

Fault in GP-IB/RS-232C Interface
Is each +5 V (5 V to 5.3 V)/+12 V (10.5 V to 13.5 V)/and -12 V (-11.4 V to -12.6 V) power supply at J4 14 in Z2 normal? (Note 1)
No
Q5 to J4-33 route/F2 to J4-31/Q6 to J4-34 route is faulty.
Yes
Is waveform at output of Q66 8 normal?
No
Q66 or some circuit connected to Q66 is faulty.
Yes
Does level at Q81-24 become LOW only when RS-232C used? 3
No
Z7 (RS-232C) is faulty.
Yes
A
Note 1:
Disconnect the connector to J4 and measure each DC voltage line.

Fig. 3-65 GP-IB or RS-232C Interface Troubleshooting Flowchart

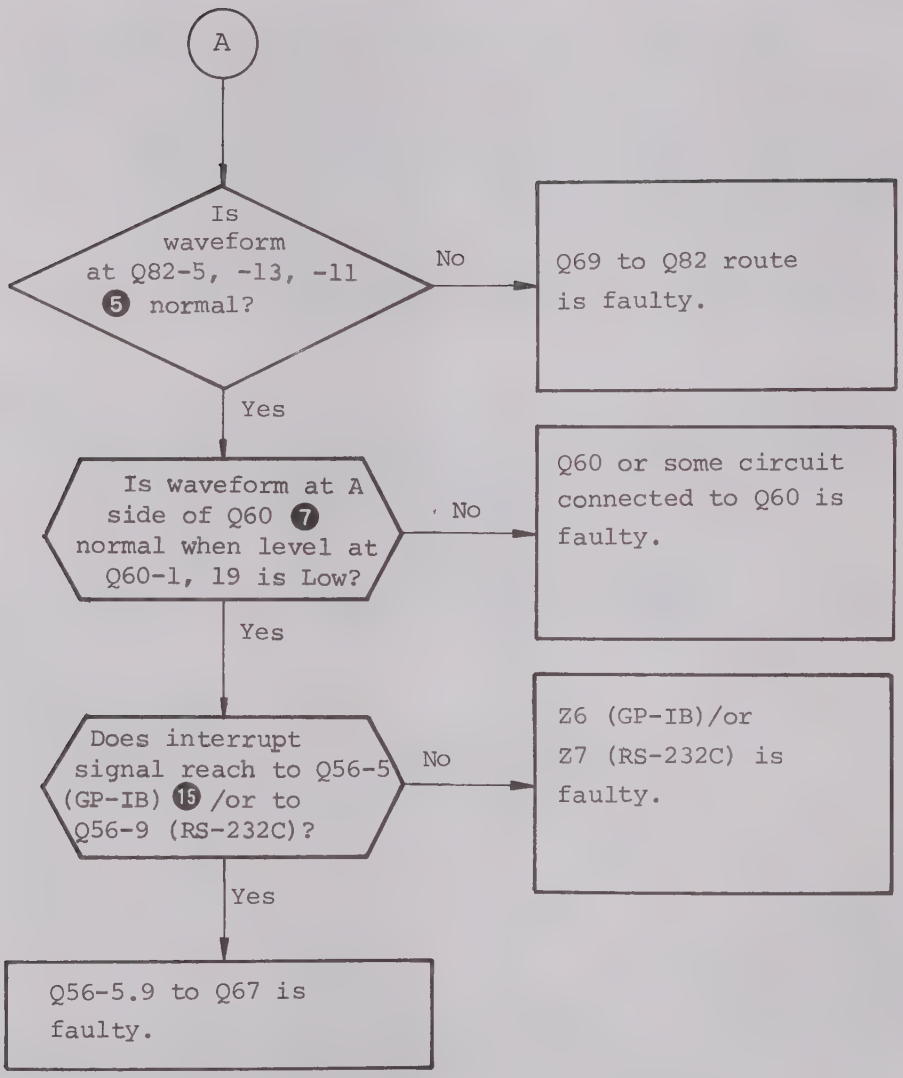

A
Is waveform at Q82-5, -13, -11 ❺ normal?
No
Q69 to Q82 route is faulty.
Yes
Is waveform at A side of Q60 ❼ normal when level at Q60-1, 19 is Low?
No
Q60 or some circuit connected to Q60 is faulty.
Yes
Does interrupt signal reach to Q56-5 (GP-IB) ⓯ /or to Q56-9 (RS-232C)?
No
Z6 (GP-IB)/or Z7 (RS-232C) is faulty.
Yes
Q56-5.9 to Q67 is faulty.

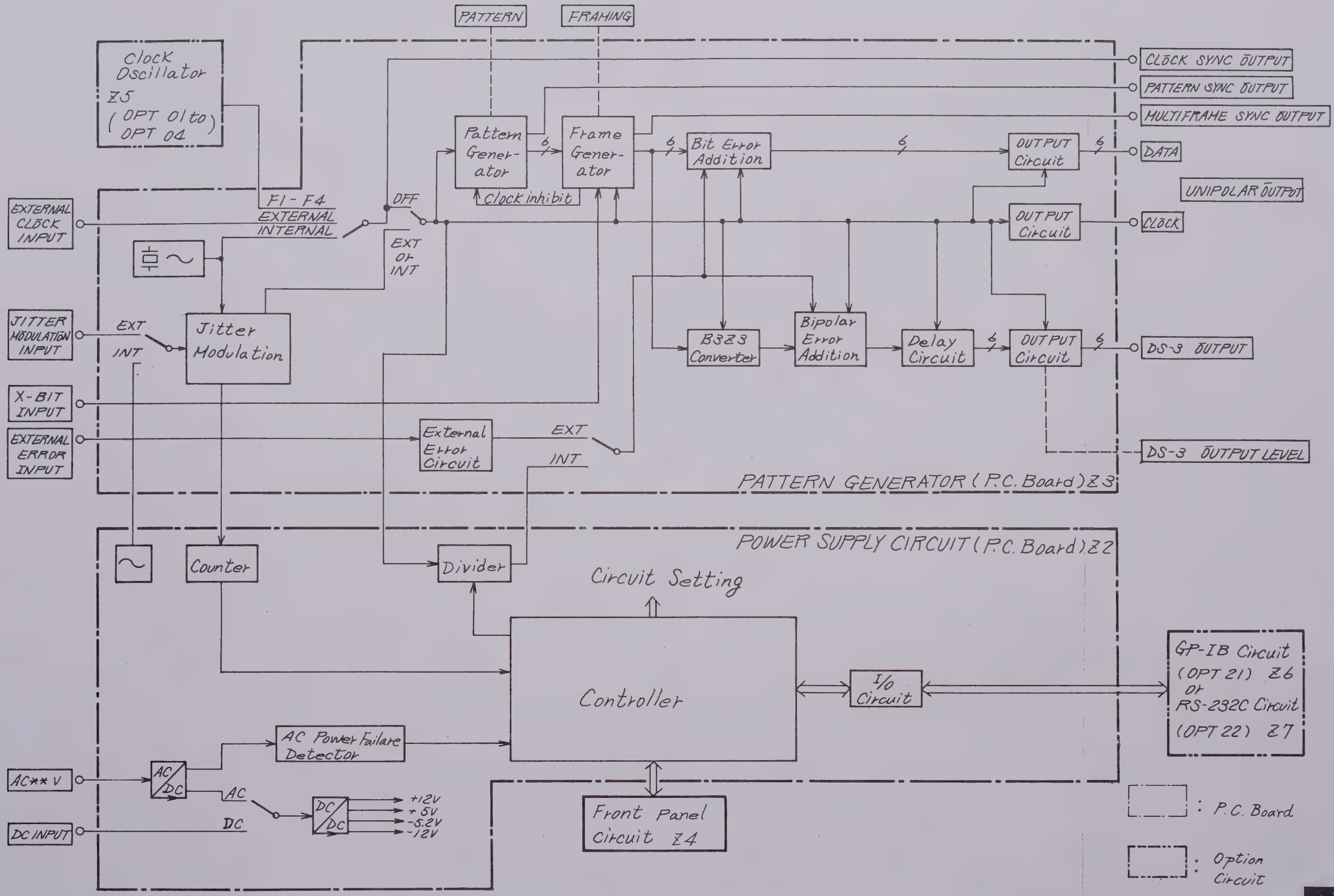
Fig. 3-65 (Cont.) GP-IB or RS-232C Interface Troubleshooting Flowchart

3.4 Block Diagram and Circuit Diagram

Table 3-9 lists the circuit names and the block/ circuit diagram numbers.

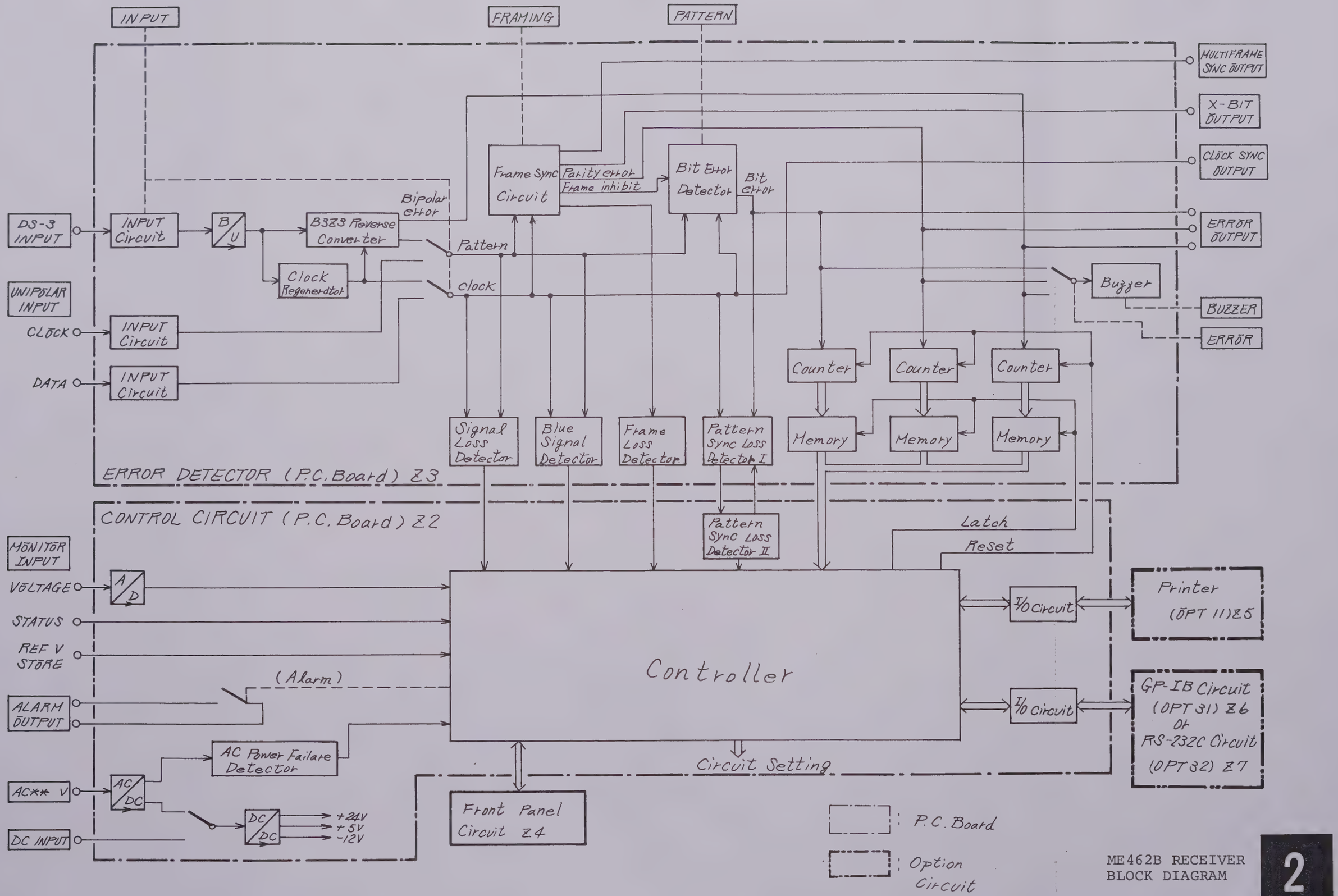
Table 3-9 List of Circuit No. vs. Block/Circuit Diagram

Circuit Diagram No.	Z No.	Name	Table No.
1		Block Diagram of ME462B Transmitter	
2		Block Diagram of ME462B Receiver	
3		Circuit Diagram of ME462B Transmitter Unit	Table 4-1
4	Z2	Circuit Diagram of POWER SUPPLY Circuit	Table 4-2
5	Z3	Circuit Diagram of PATTERN GENERATOR	Table 4-3
6	Z4	Circuit Diagram of FRONT PANEL Circuit	Table 4-4
7	Z5	Circuit Diagram of OPTION 01 to OPTION 04	Table 4-5
8	Z6	Circuit Diagram of GP-IB Interface Circuit	Table 4-6
9	Z7	Circuit Diagram of RS-232C Interface Circuit	Table 4-7
10		Circuit Diagram of ME462B Receiver Unit	Table 4-8
11	Z3	Circuit Diagram of BIT ERROR DETECTOR	Table 4-9
12	Z2	Circuit Diagram of CONTROLLER	Table 4-10
13	Z4	Circuit Diagram of FRONT PANEL Circuit	Table 4-11
14	Z8	Circuit Diagram of Switch Circuit	Table 4-12



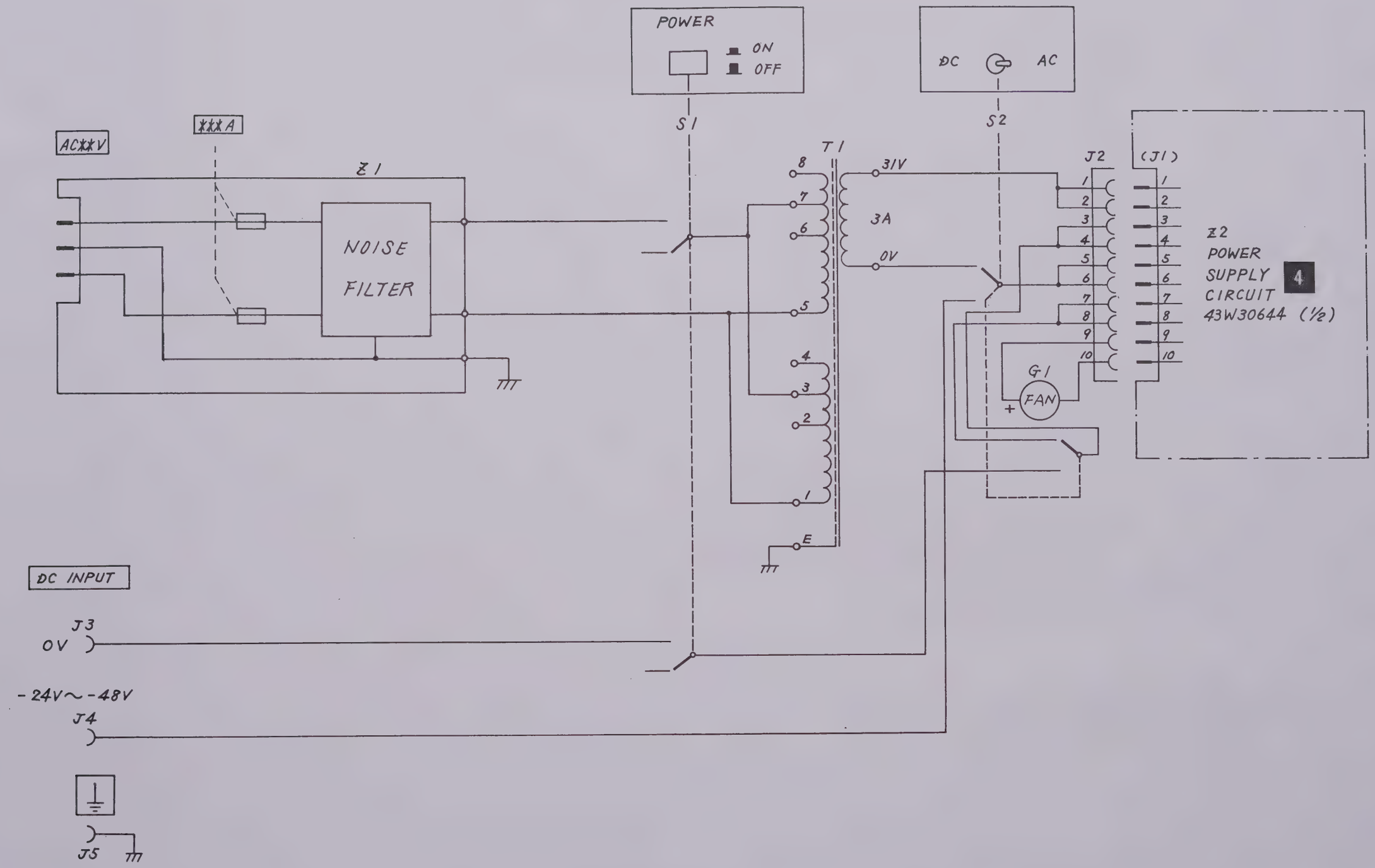
ME462B TRANSMITTER
BLOCK DIAGRAM

1

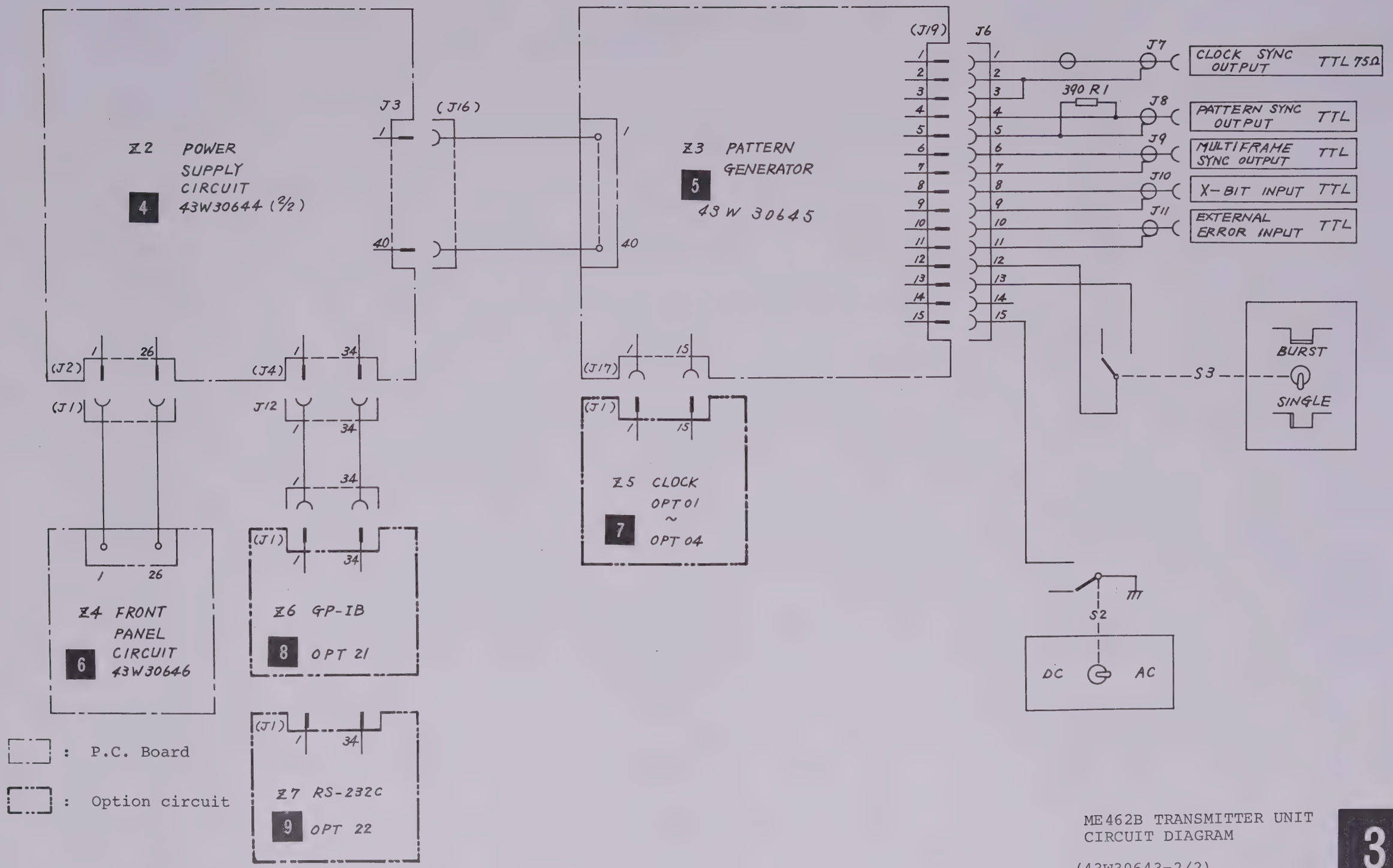


ME462B RECEIVER
BLOCK DIAGRAM

2



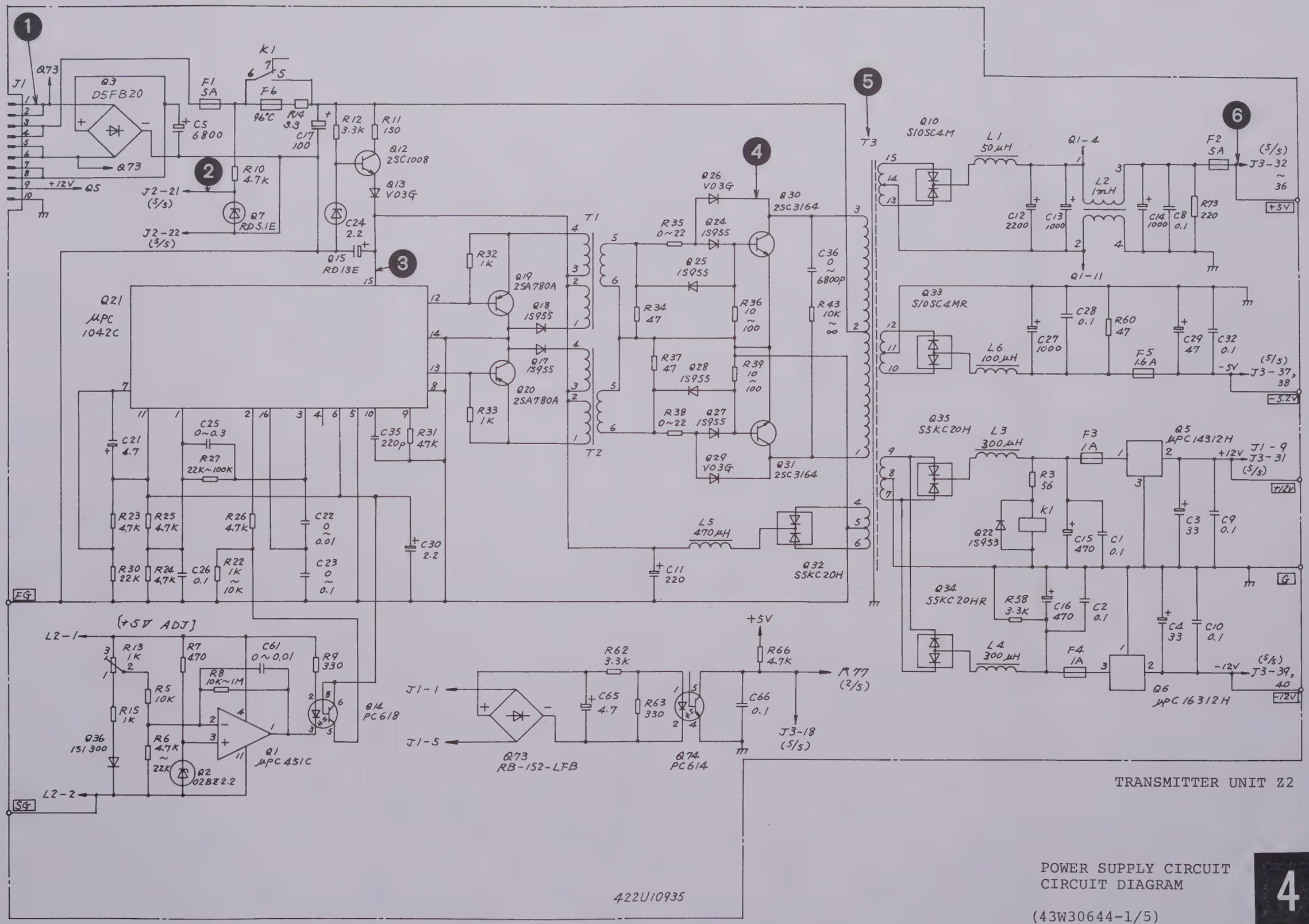
Component List reference (Table 4-1)



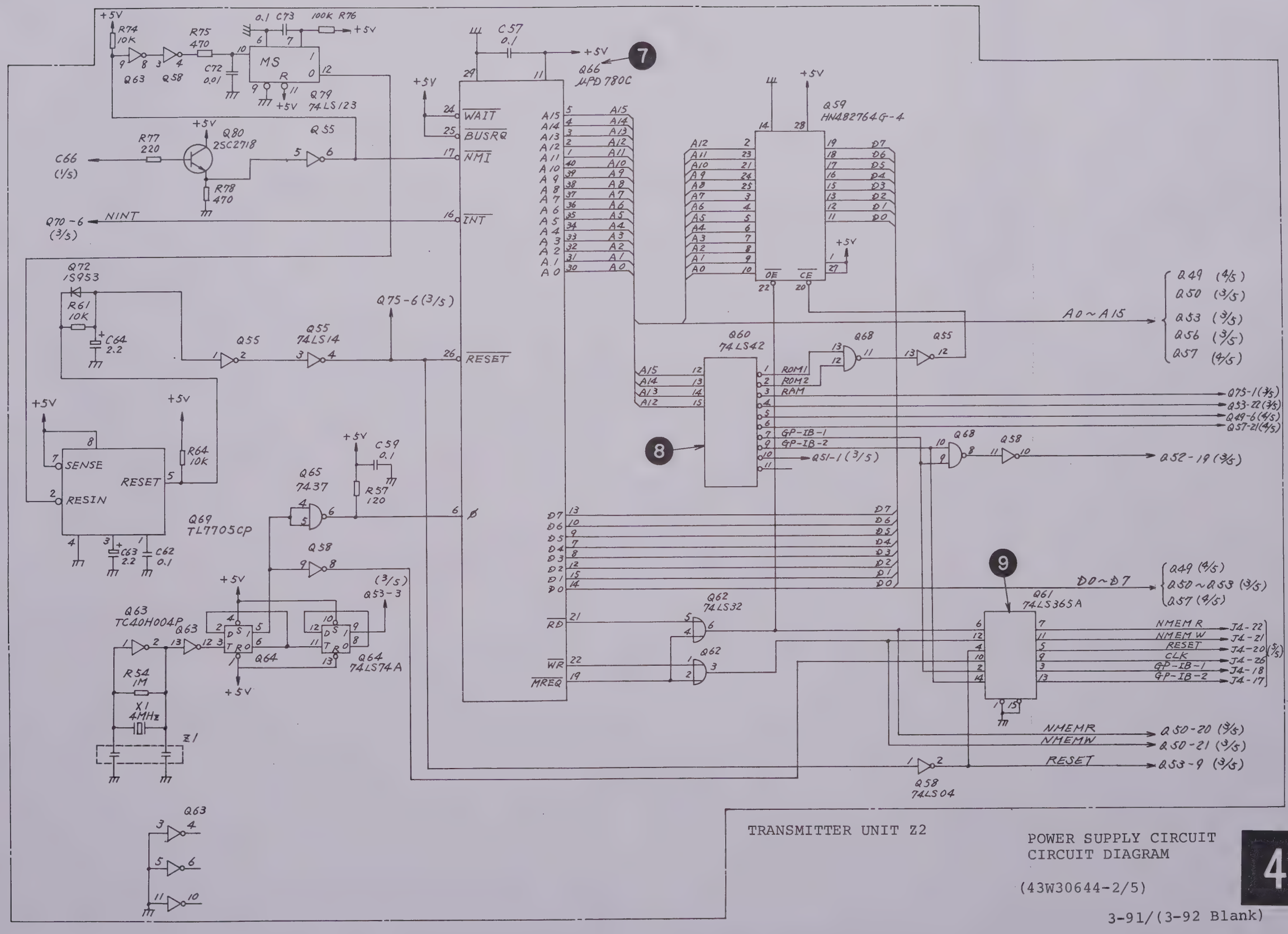
ME462B TRANSMITTER UNIT
CIRCUIT DIAGRAM

(43W30643-2/2)

3



Component List reference (Table 4-2)

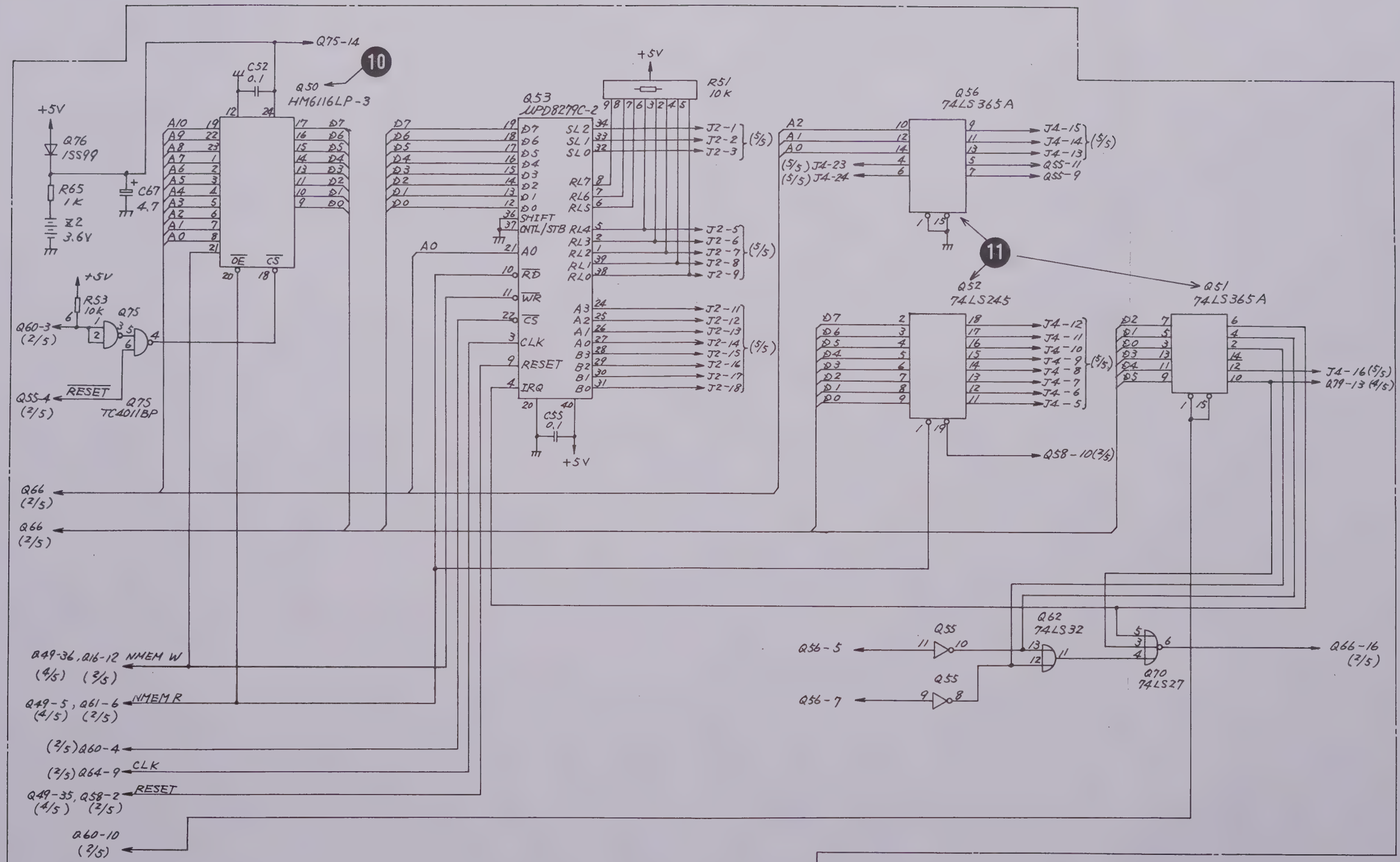


TRANSMITTER UNIT Z2

POWER SUPPLY CIRCUIT
CIRCUIT DIAGRAM

(43W30644-2/5)

4

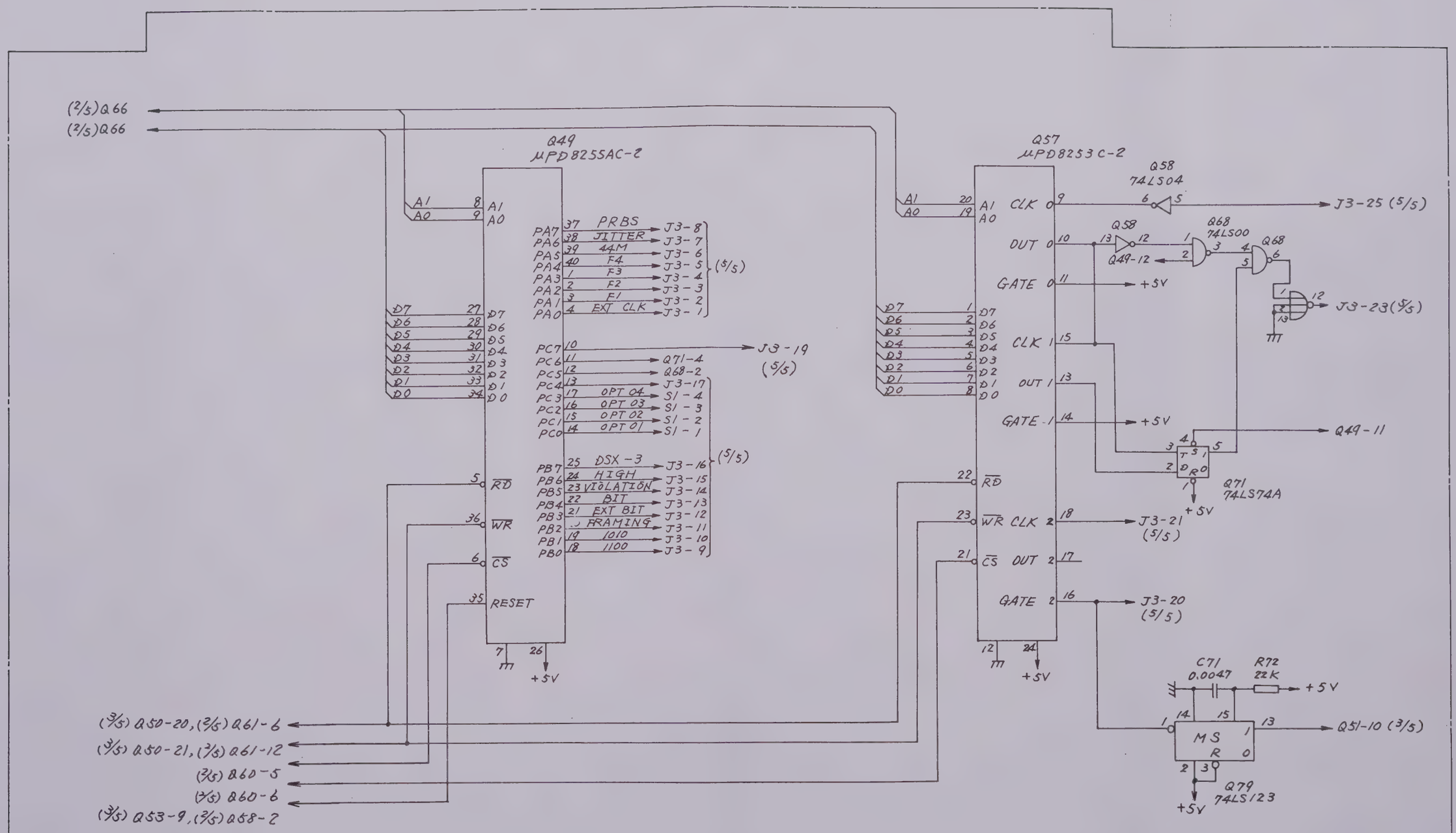


TRANSMITTER UNIT Z2

POWER SUPPLY CIRCUIT
CIRCUIT DIAGRAM

(43W30644-3/5)

4



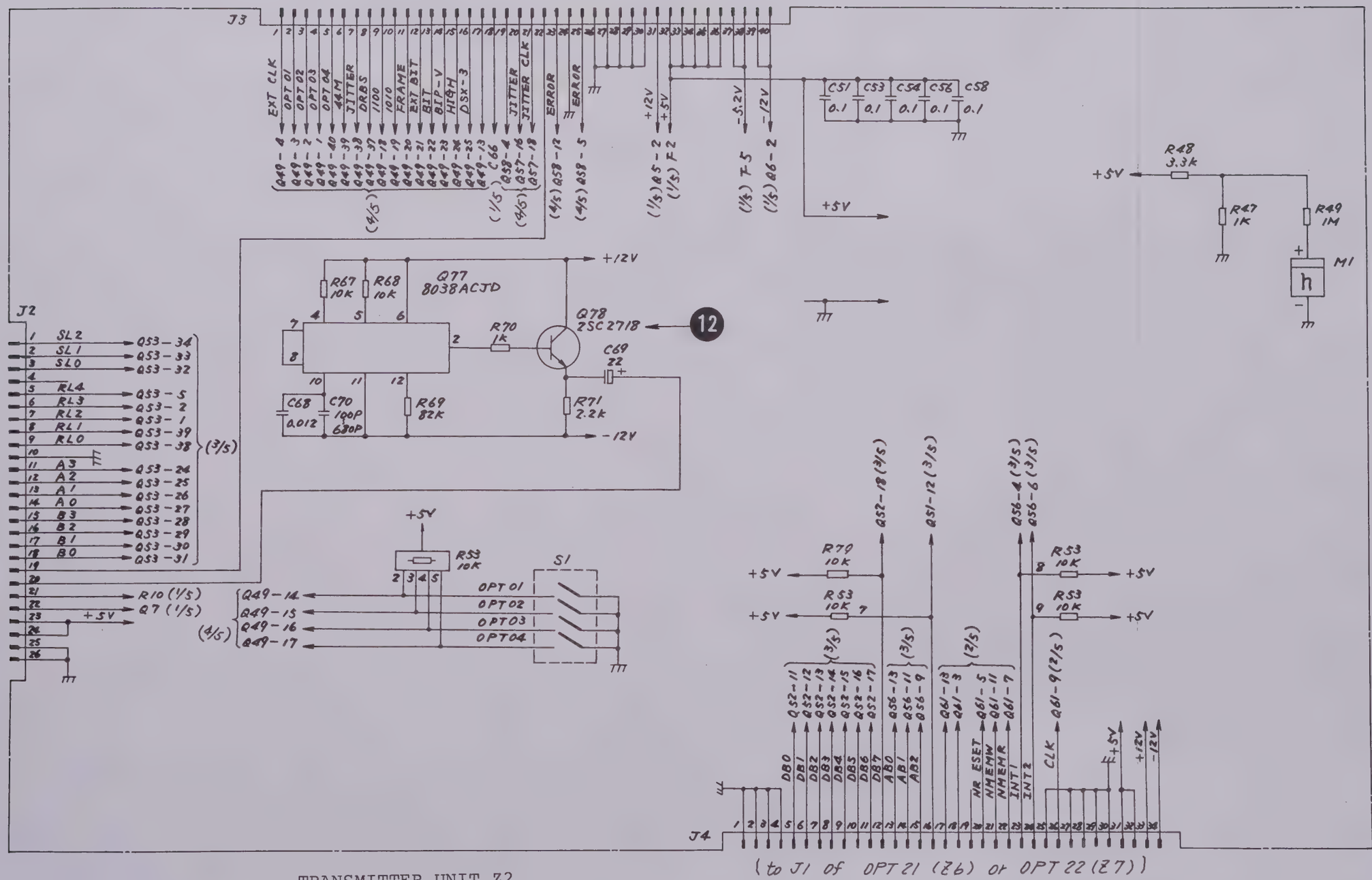
TRANSMITTER UNIT Z2

POWER SUPPLY CIRCUIT
CIRCUIT DIAGRAM

(43W30644-4/5)

4

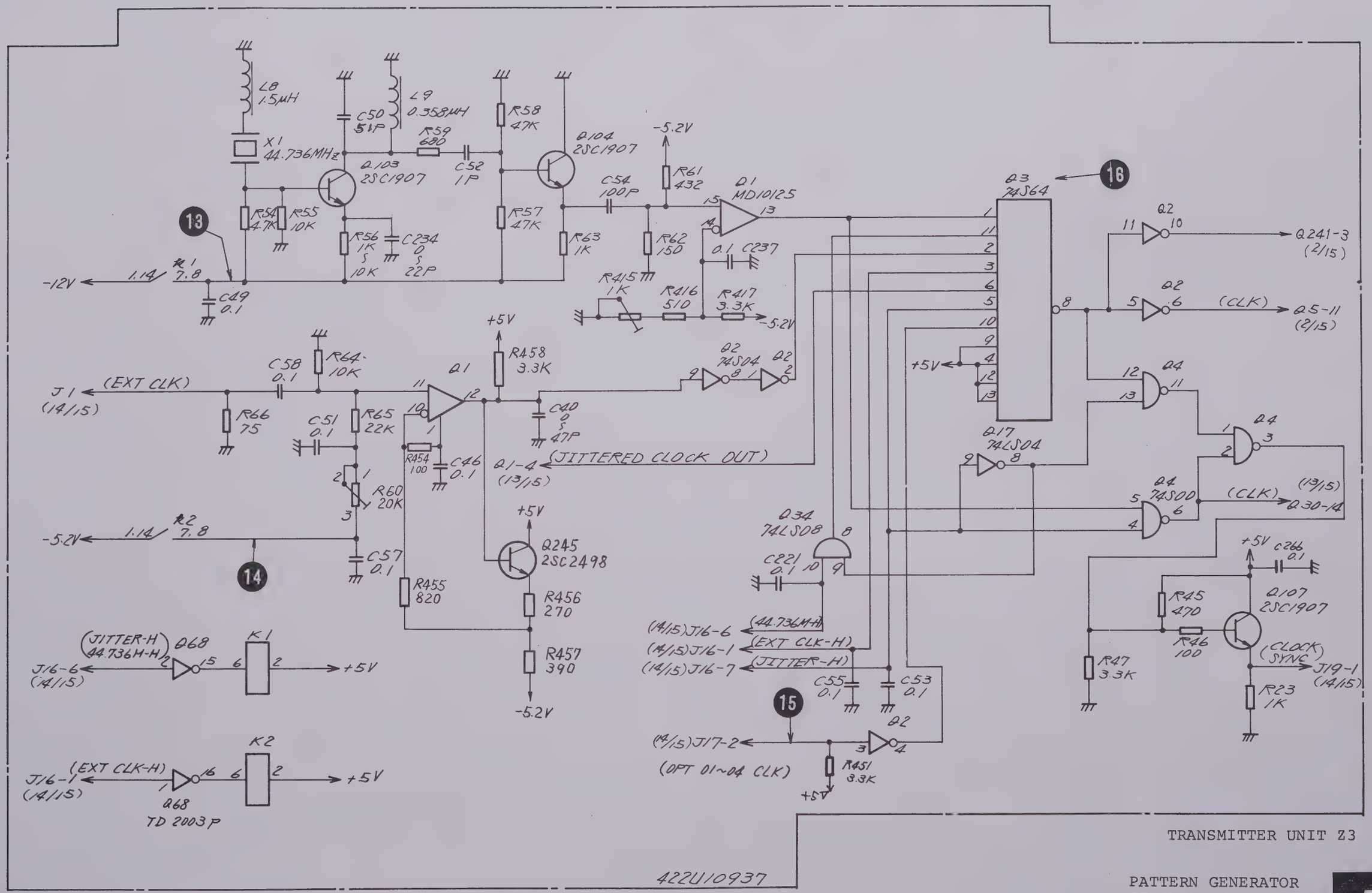
(to Z3 : Pattern Generator Circuit)



TRANSMITTER UNIT Z2

POWER SUPPLY
CIRCUIT DIAGRAM
(43W30644-5/5)

4



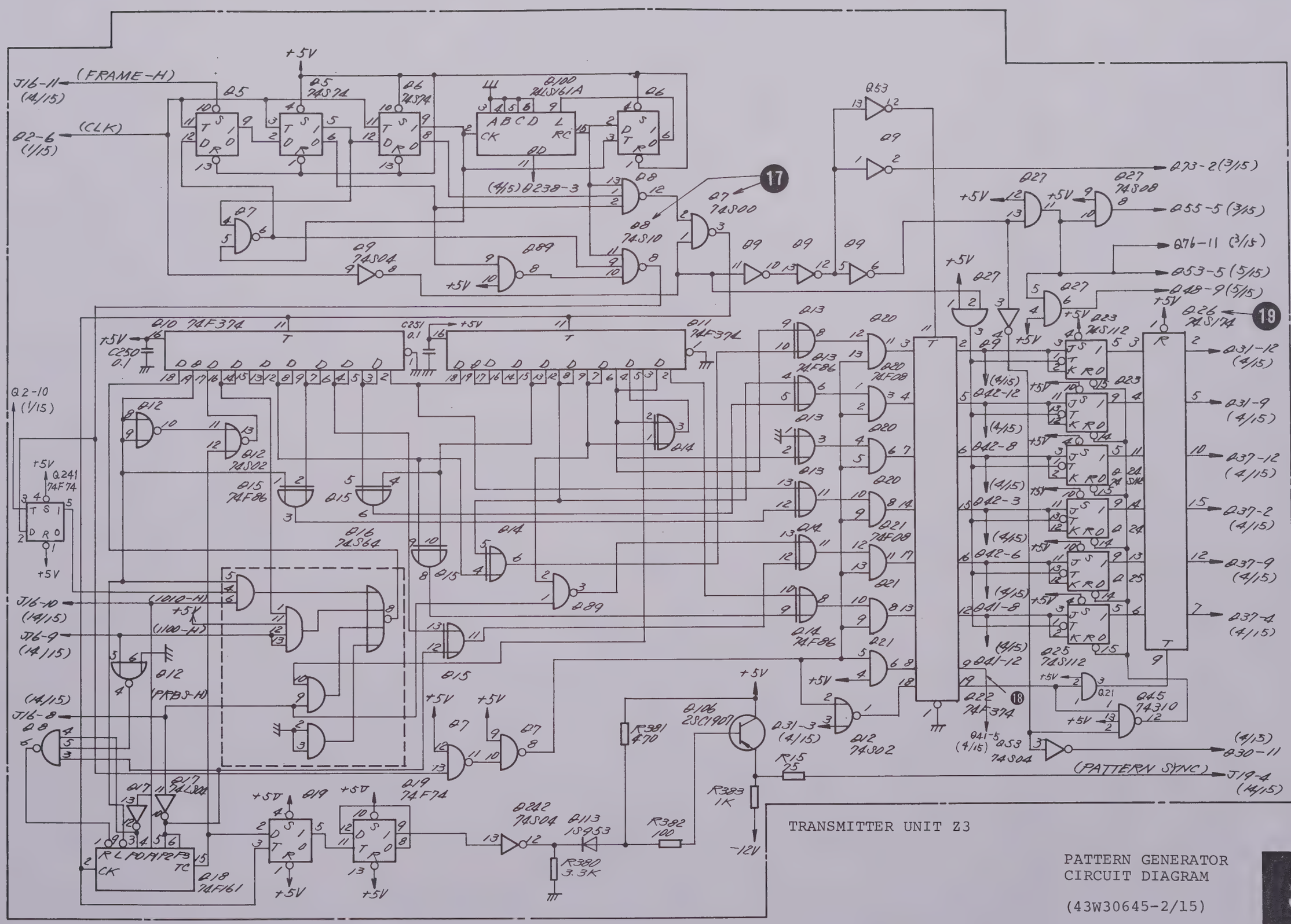
TRANSMITTER UNIT Z3

PATTERN GENERATOR
CIRCUIT DIAGRAM

(43W30645-1/15)

5

Component List reference (Table 4-3)

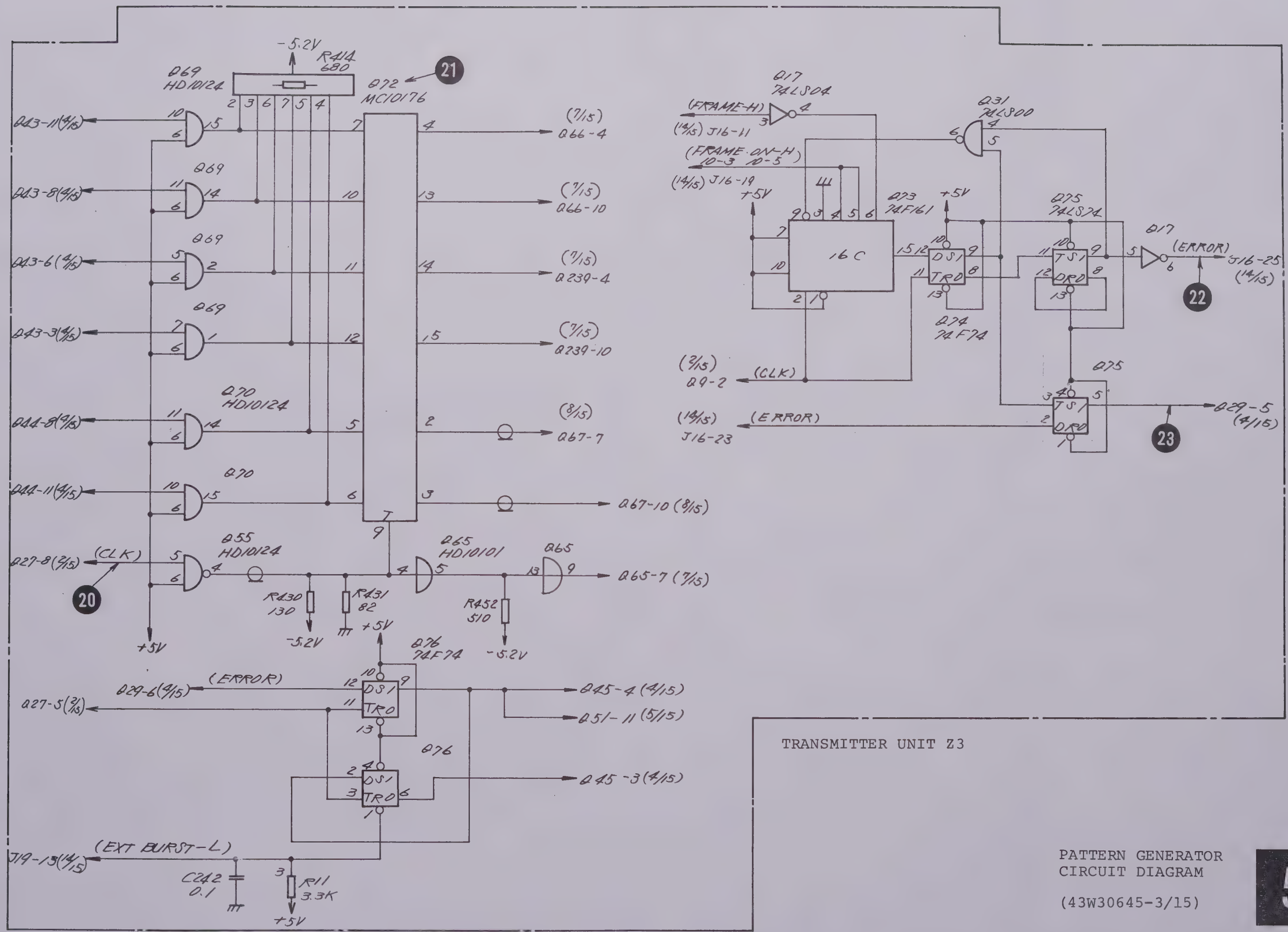


TRANSMITTER UNIT Z3

PATTERN GENERATOR
CIRCUIT DIAGRAM

(43W30645-2/15)

5

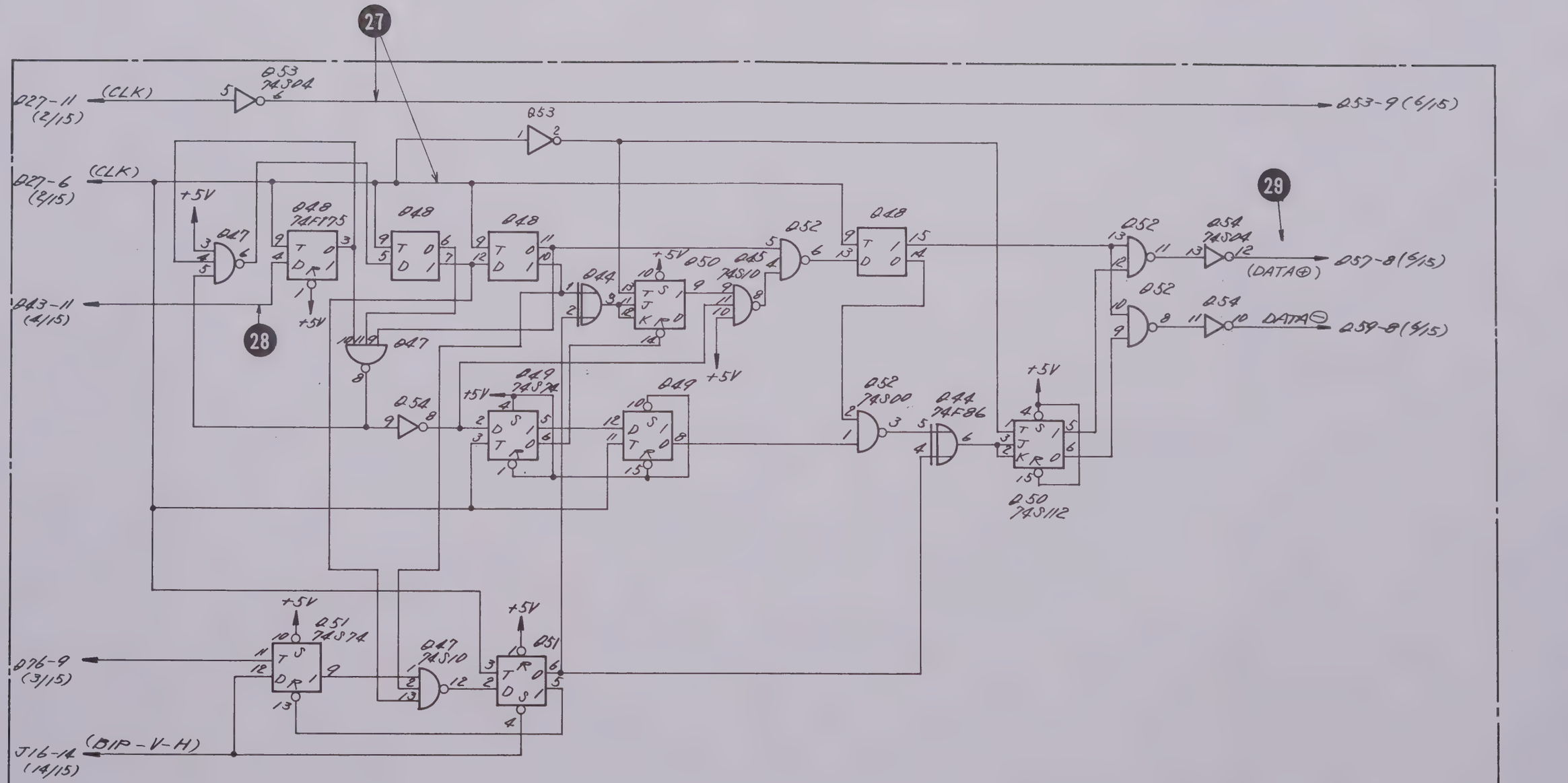


TRANSMITTER UNIT Z3

PATTERN GENERATOR
CIRCUIT DIAGRAM

(43W30645-3/15)

5



TRANSMITTER
UNIT Z3

PATTERN GENERATOR
CIRCUIT DIAGRAM

(43W30645-5/15)

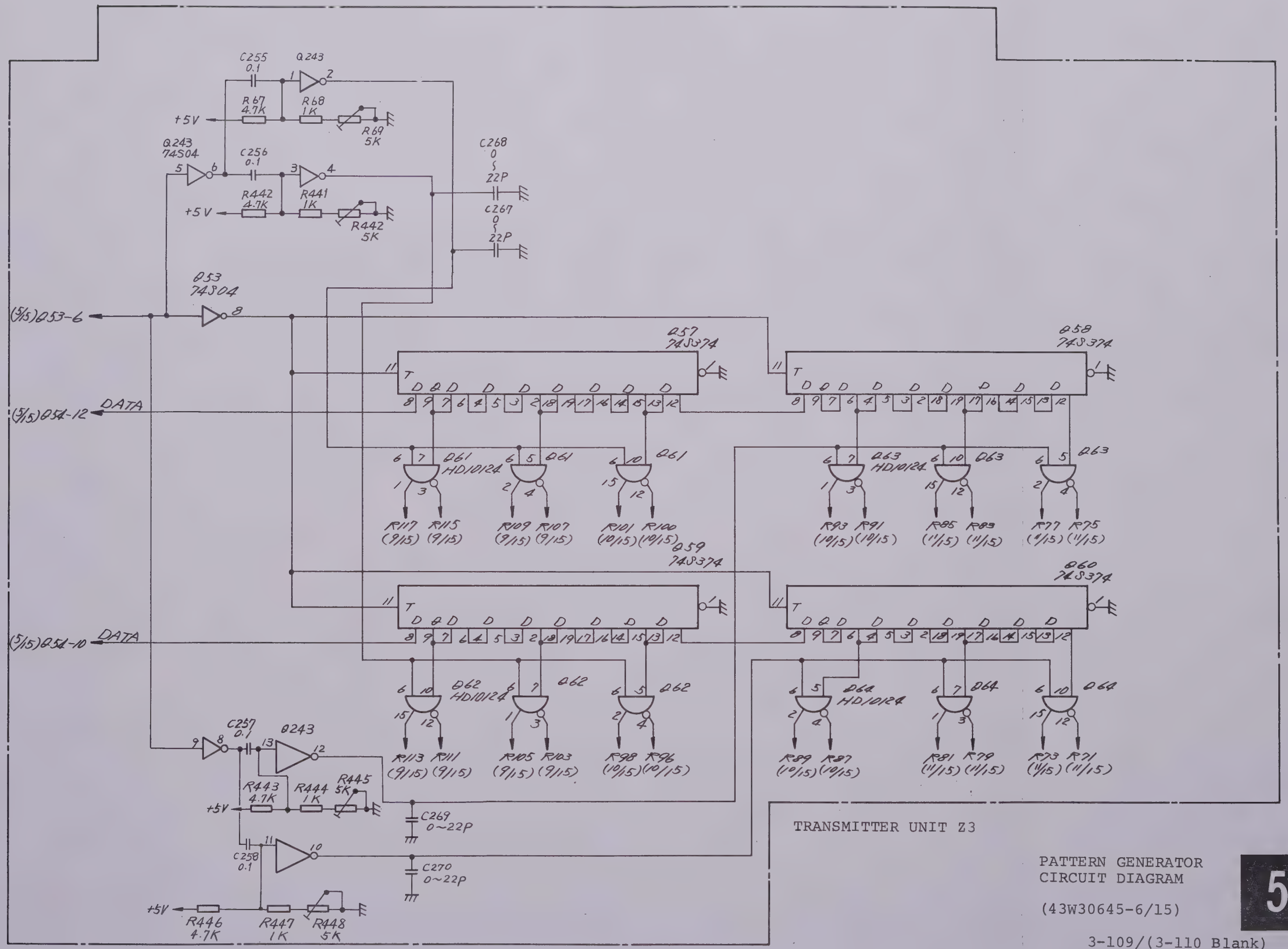
5

TRANSMITTER UNIT Z3

PATTERN GENERATOR
CIRCUIT DIAGRAM

(43W30645-4/15)

5

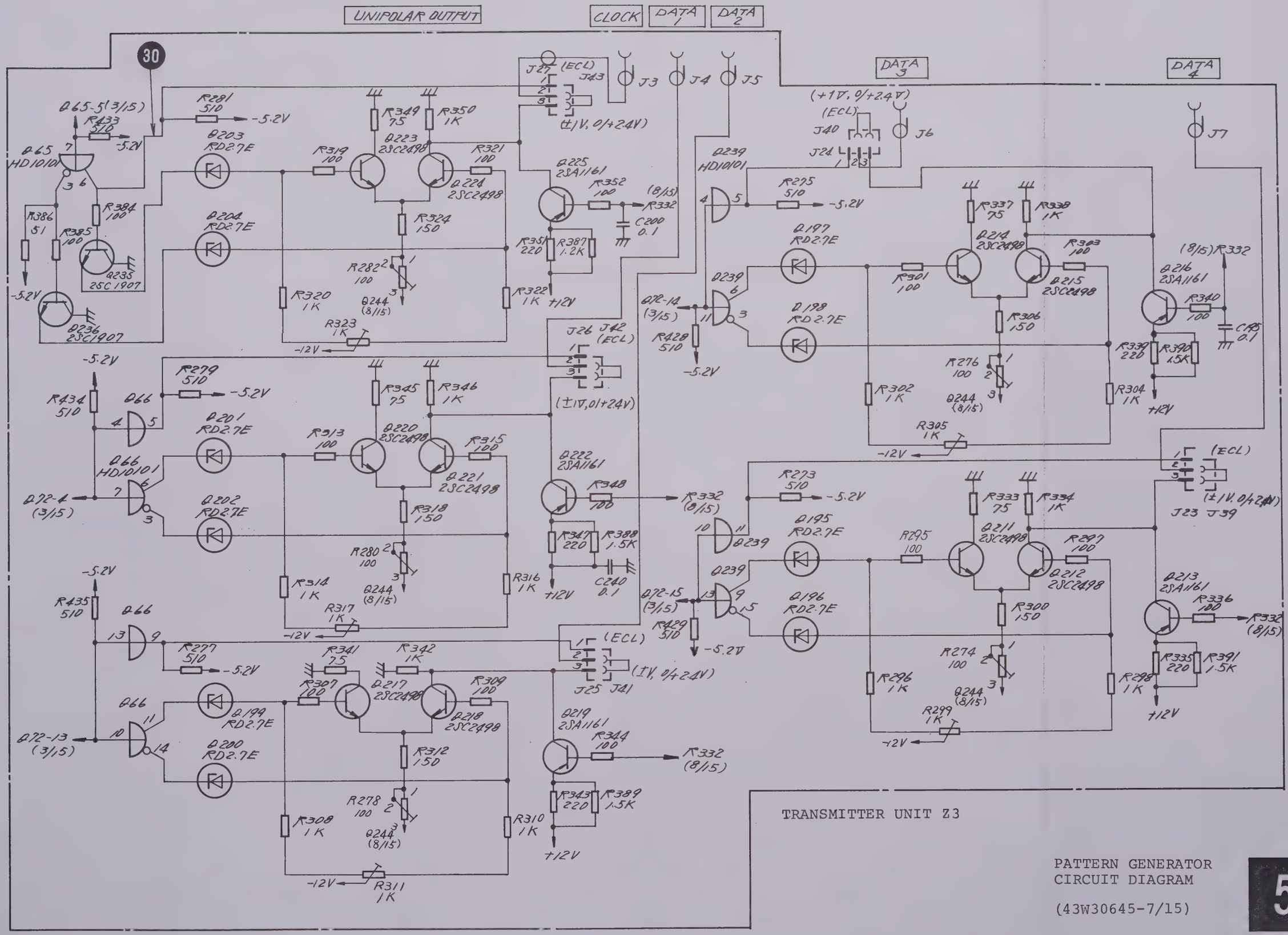


TRANSMITTER UNIT Z3

PATTERN GENERATOR
CIRCUIT DIAGRAM

(43W30645-6/15)

5

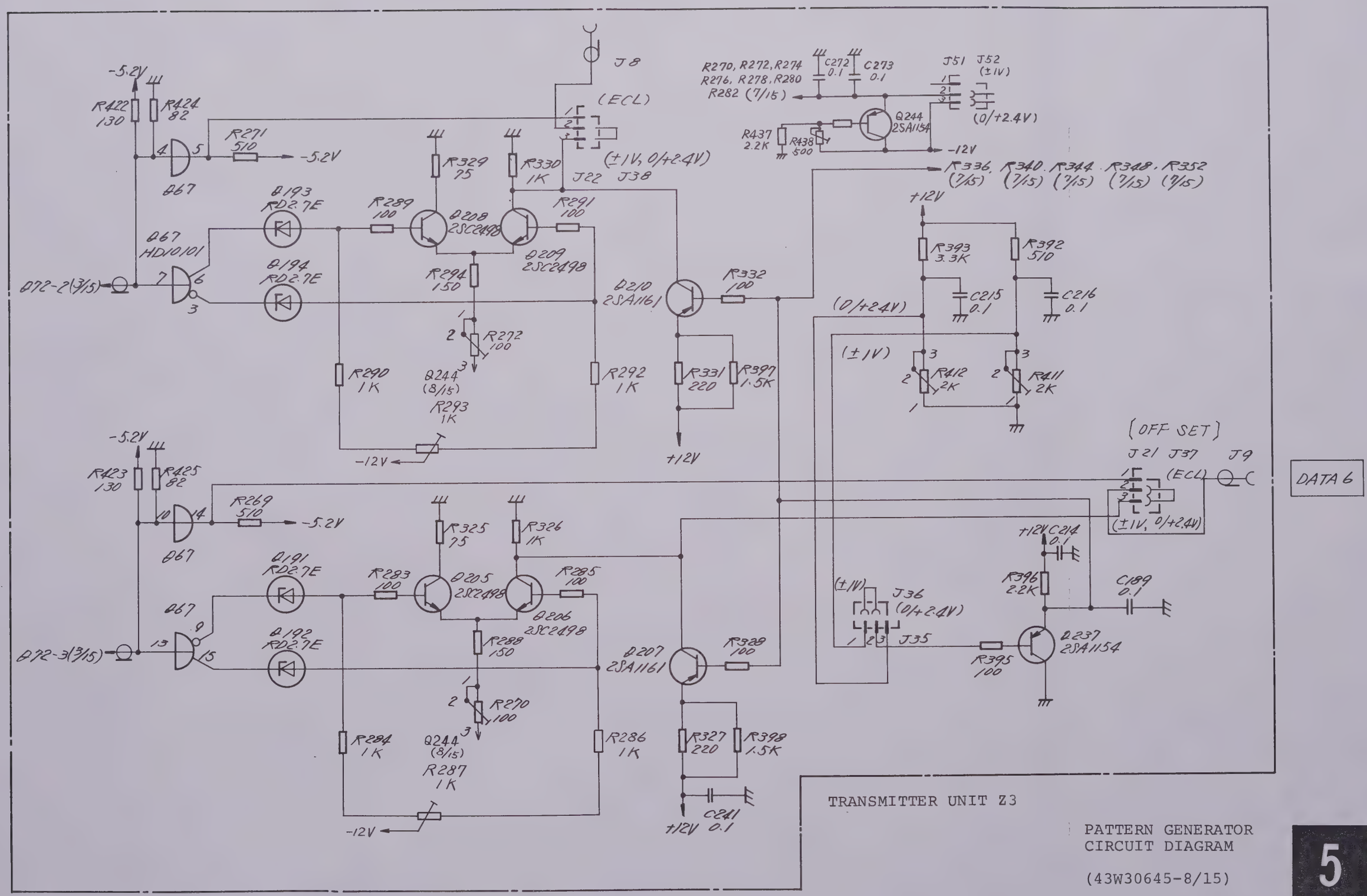


PATTERN GENERATOR
CIRCUIT DIAGRAM

(43W30645-7/15)

5

DATA 5



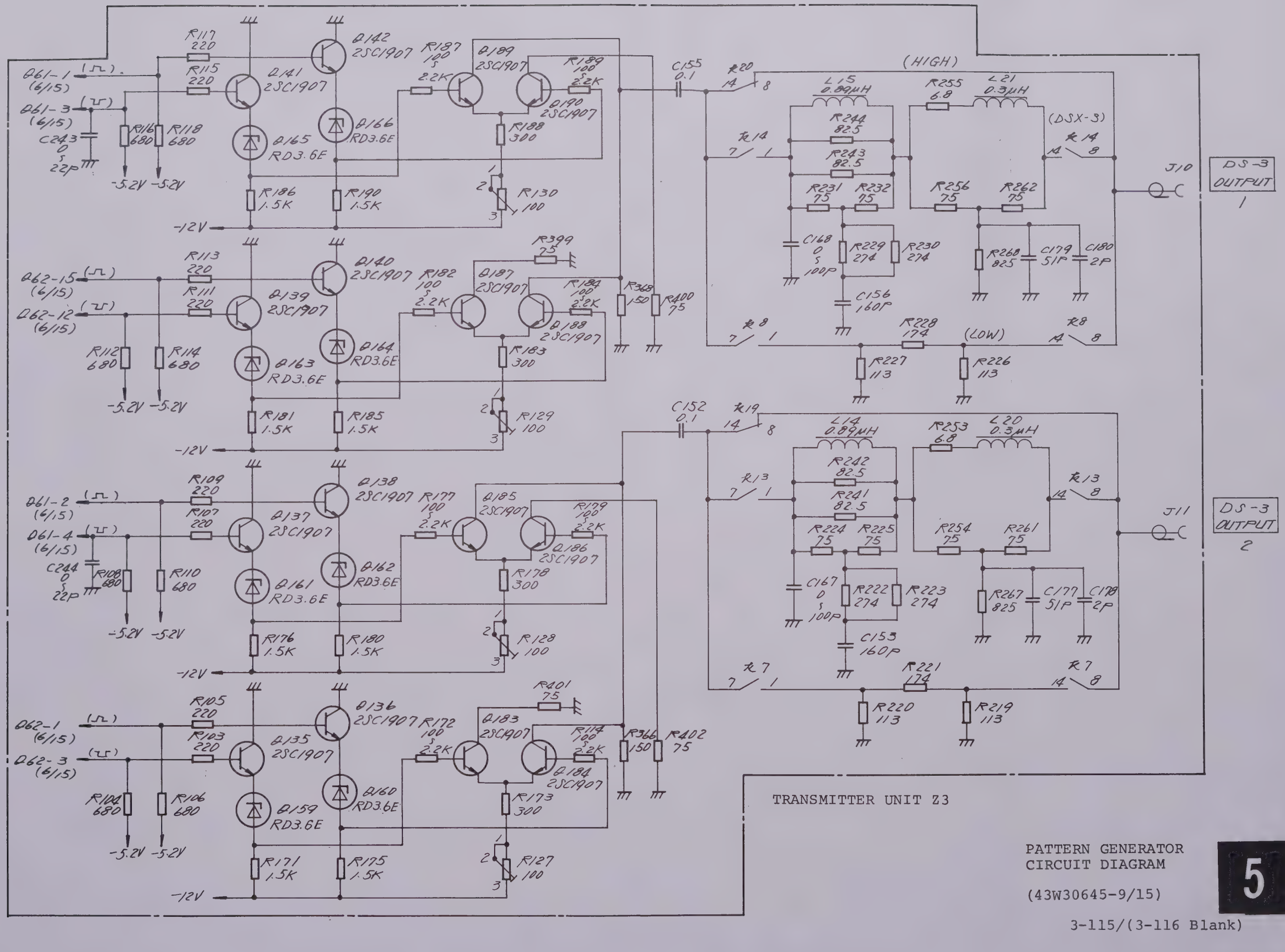
DATA 6

TRANSMITTER UNIT Z3

PATTERN GENERATOR
CIRCUIT DIAGRAM

(43W30645-8/15)

5

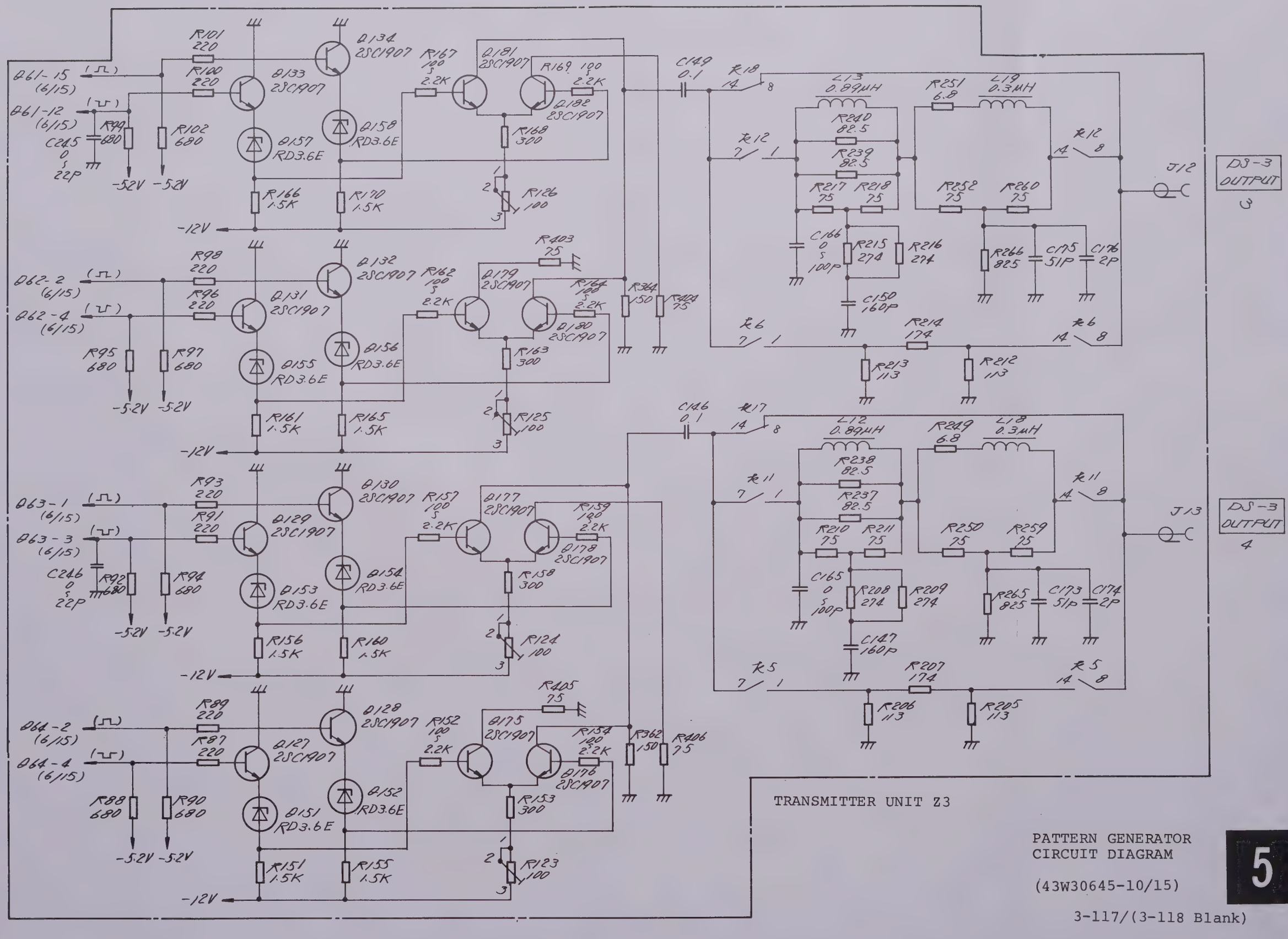


TRANSMITTER UNIT Z3

PATTERN GENERATOR
CIRCUIT DIAGRAM

(43W30645-9/15)

5

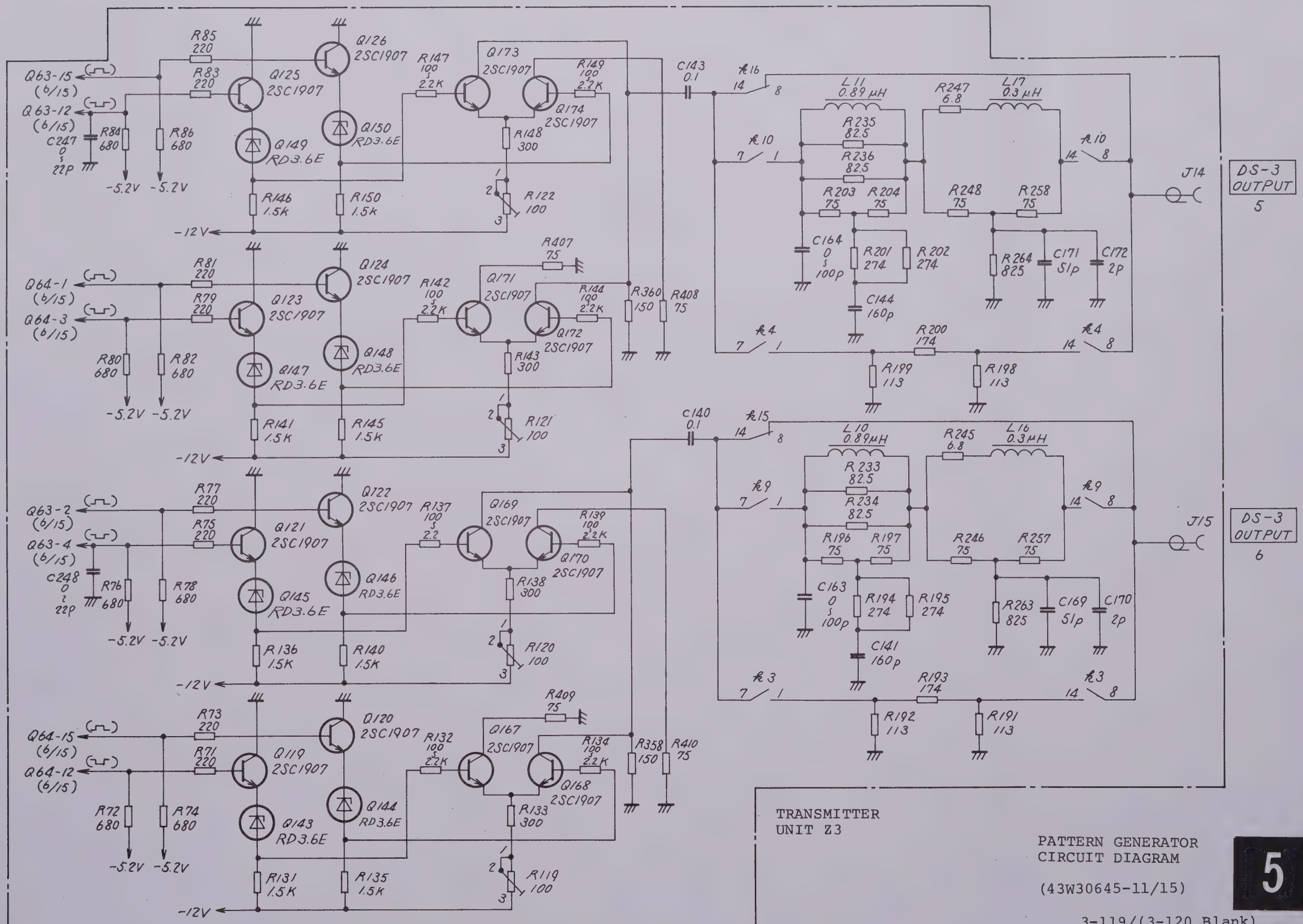


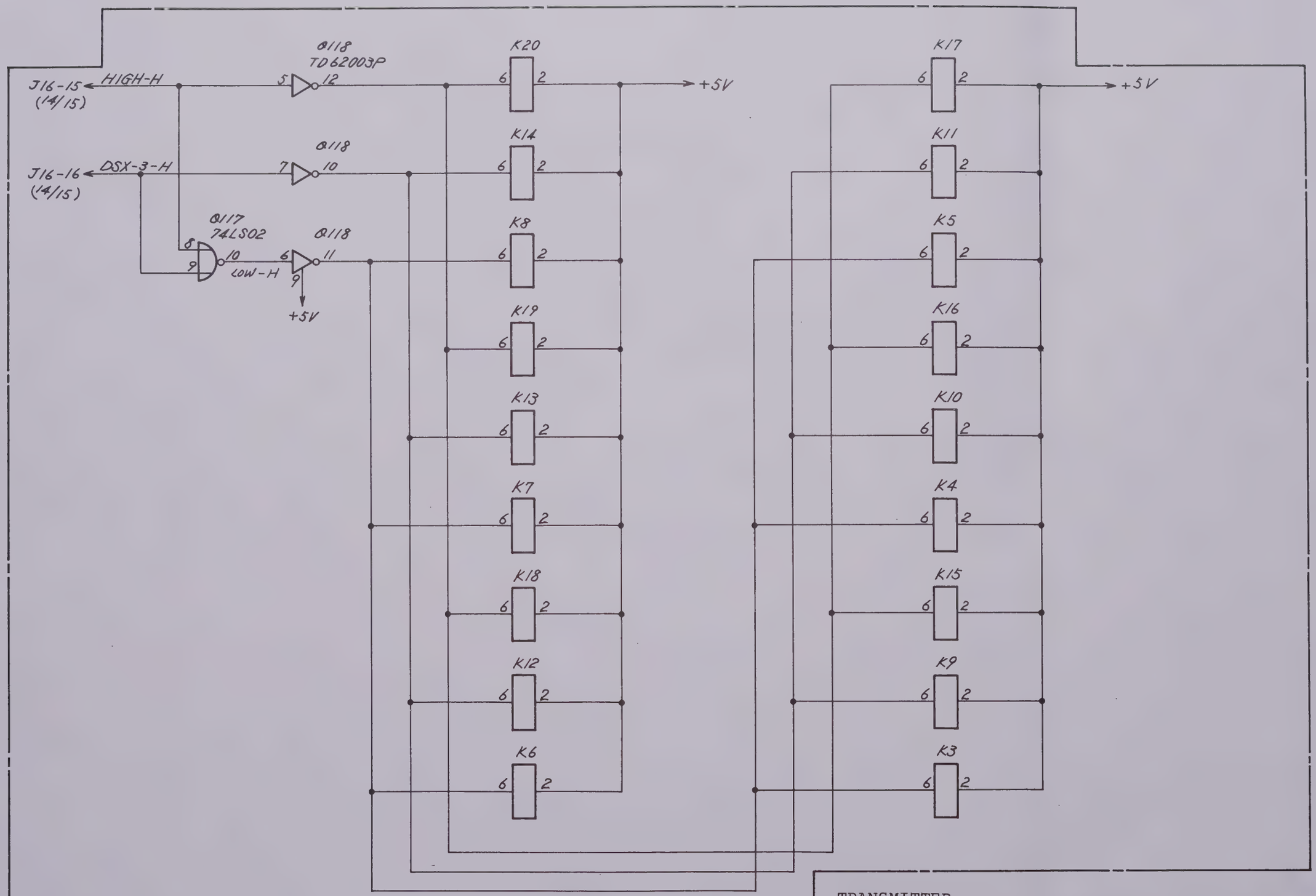
TRANSMITTER UNIT Z3

PATTERN GENERATOR
CIRCUIT DIAGRAM

(43W30645-10/15)

5


Q63-15 (6/15)
Q63-12 (6/15)
C247 0 ± 22P
R84 680
R86 680
-5.2V -5.2V
R85 220
R83 220
Q125 2SC1907
Q126 2SC1907
Q149 RD3.6E
Q150 RD3.6E
R147 100 ± 2.2K
Q173 2SC1907
R149 100 ± 2.2K
Q174 2SC1907
R148 300
R146 1.5K
R150 1.5K
R122 100
-12V
C143 0.1
R16
R10
R4
L11 0.89μH
L17 0.3μH
R247 6.8
R235 82.5
R236 82.5
R203 75
R204 75
R248 75
R258 75
C164 0 ± 100P
R201 274
R202 274
C144 160P
R264 825
C171 51P
C172 2P
R200 174
R199 113
R198 113
J14
DS-3 OUTPUT 5
Q64-1 (6/15)
Q64-3 (6/15)
R81 220
R79 220
Q123 2SC1907
Q124 2SC1907
Q147 RD3.6E
Q148 RD3.6E
R80 680
R82 680
-5.2V -5.2V
R142 100 ± 2.2K
Q171 2SC1907
R407 75
R144 100 ± 2.2K
Q172 2SC1907
R143 300
R360 150
R408 75
R141 1.5K
R145 1.5K
R121 100
-12V
C140 0.1
R15
L10 0.89μH
L16 0.3μH
R245 6.8
R233 82.5
R234 82.5
R196 75
R197 75
R246 75
R257 75
C163 0 ± 100P
R194 274
R195 274
C141 160P
R263 825
C169 51P
C170 2P
R193 174
R192 113
R191 113
J15
DS-3 OUTPUT 6
Q63-2 (6/15)
Q63-4 (6/15)
C248 0 ± 22P
R76 680
R78 680
-5.2V -5.2V
R77 220
R75 220
Q121 2SC1907
Q122 2SC1907
Q145 RD3.6E
Q146 RD3.6E
R137 100 ± 2.2
Q169 2SC1907
R139 100 ± 2.2K
Q170 2SC1907
R138 300
R136 1.5K
R140 1.5K
R120 100
-12V
R409 75
R9
R3
Q64-15 (6/15)
Q64-12 (6/15)
R73 220
R71 220
Q119 2SC1907
Q120 2SC1907
Q143 RD3.6E
Q144 RD3.6E
R72 680
R74 680
-5.2V -5.2V
R132 100 ± 2.2K
Q167 2SC1907
R134 100 ± 2.2K
Q168 2SC1907
R133 300
R358 150
R410 75
R131 1.5K
R135 1.5K
R119 100
-12V
TRANSMITTER UNIT Z3
PATTERN GENERATOR CIRCUIT DIAGRAM
(43W30645-11/15)
5
3-119/(3-120 Blank)

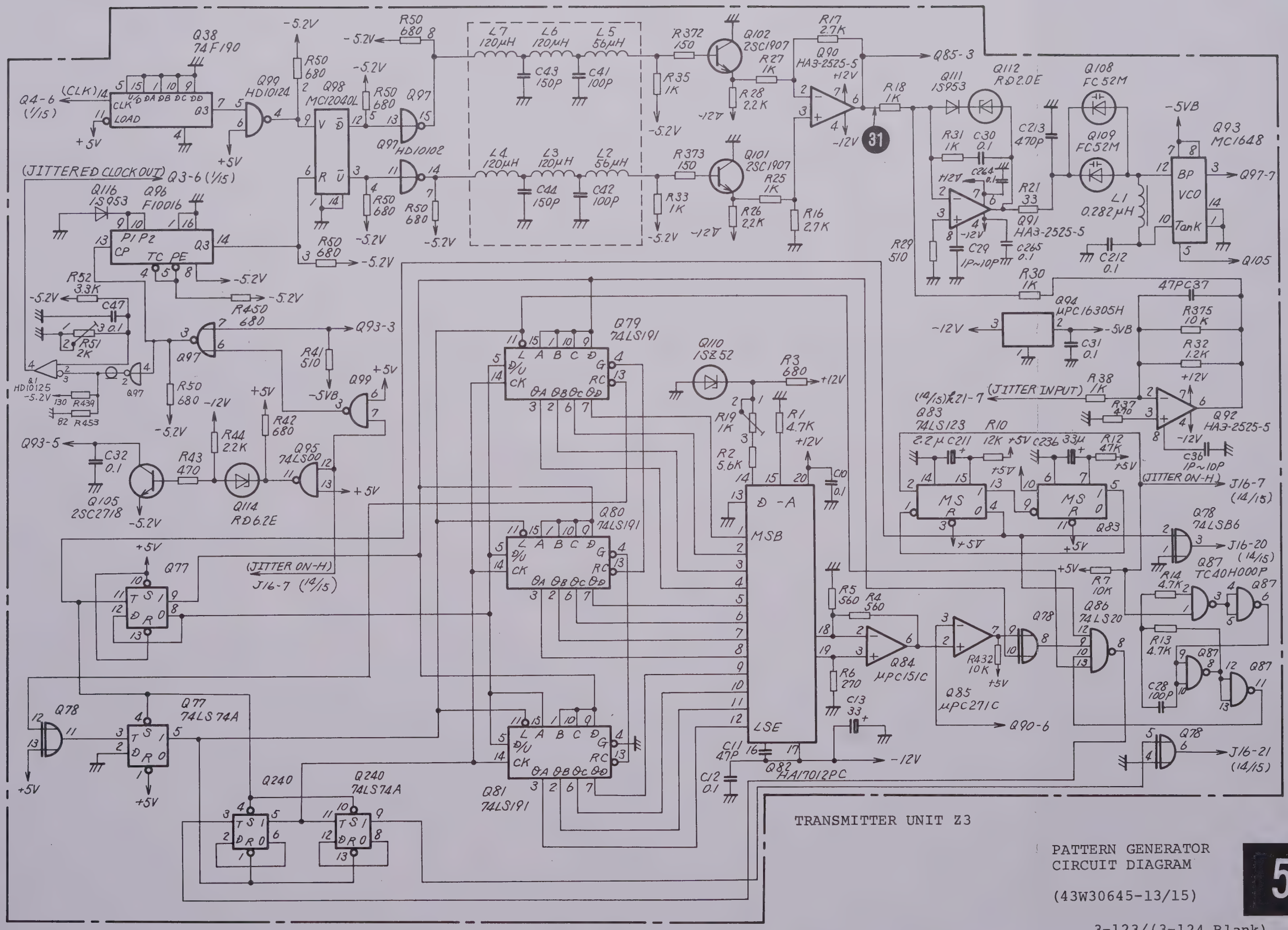


TRANSMITTER
UNIT Z3

PATTERN GENERATOR
CIRCUIT DIAGRAM

(43W30645-12/15)

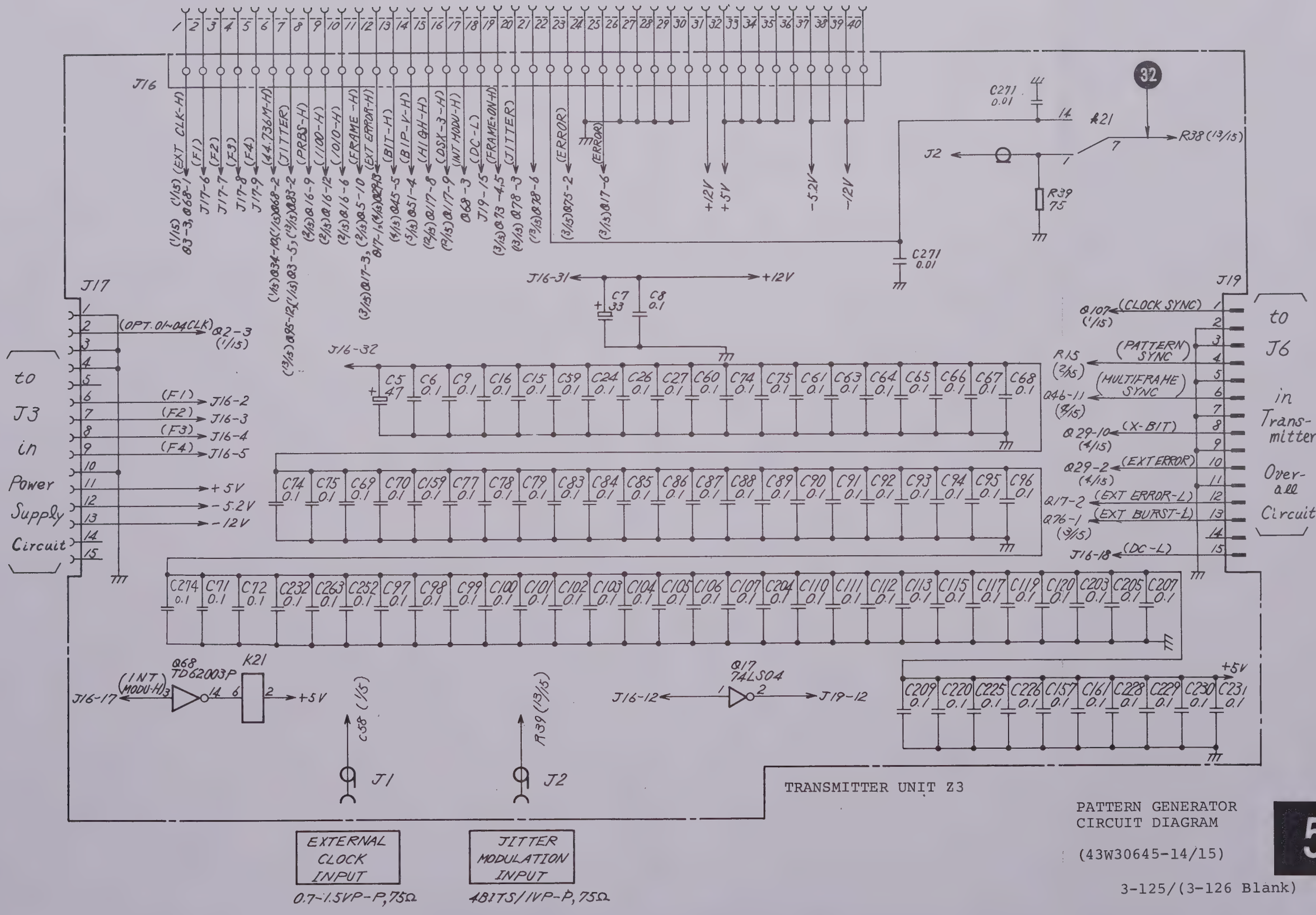
5



PATTERN GENERATOR
CIRCUIT DIAGRAM

(43W30645-13/15)

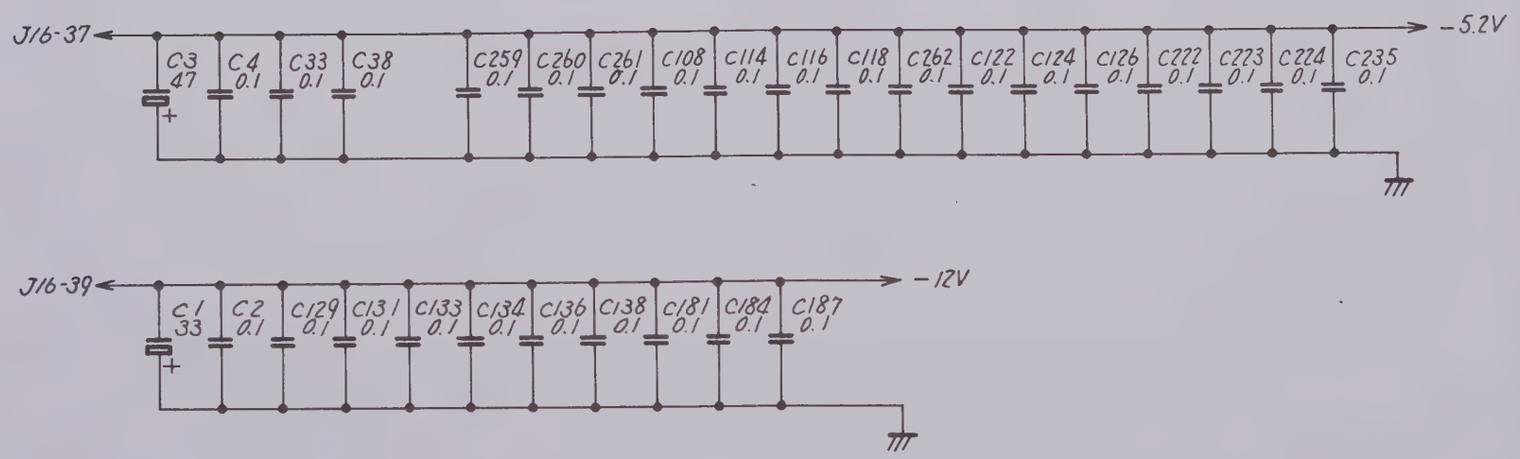
5



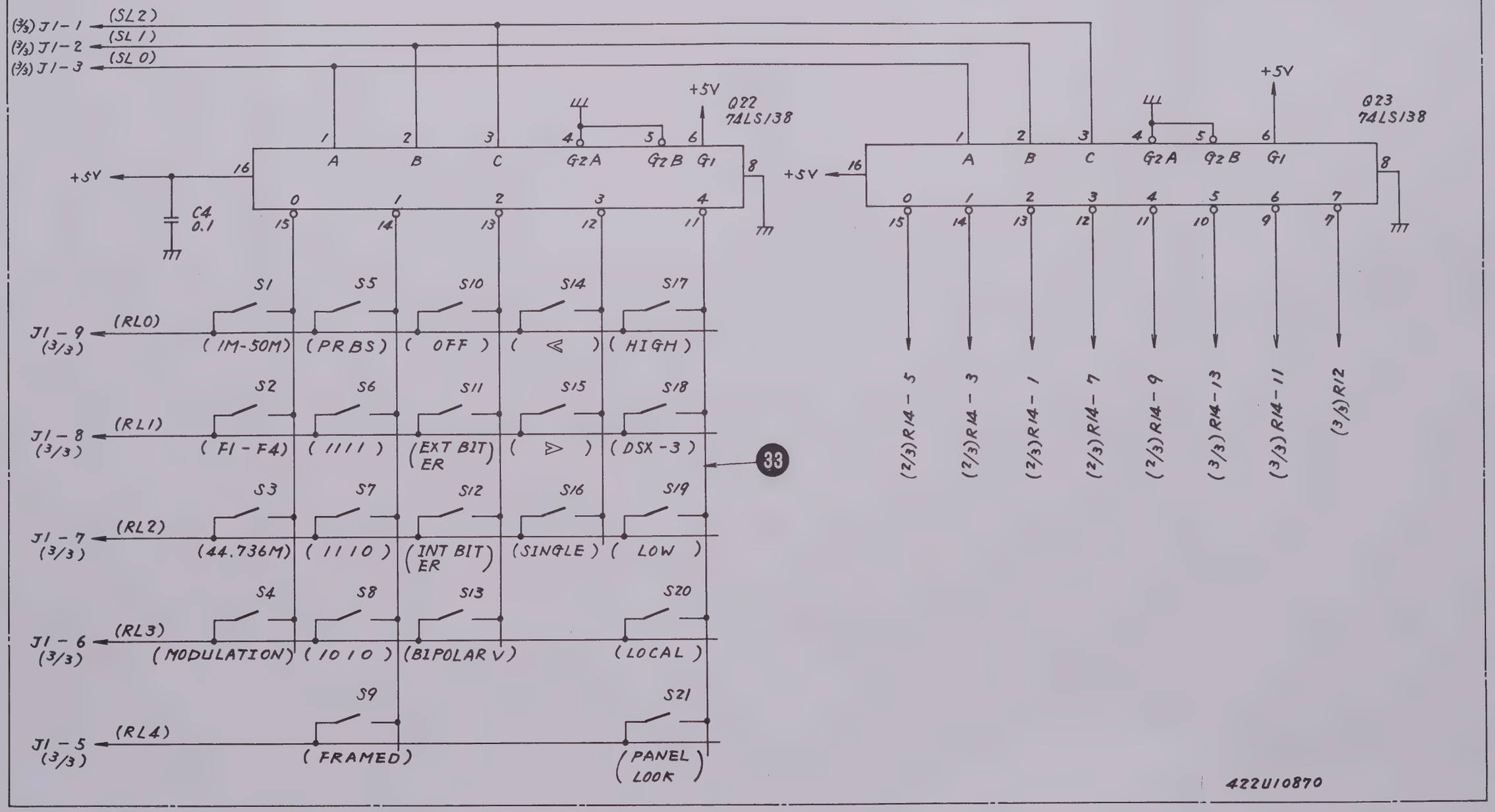
PATTERN GENERATOR
CIRCUIT DIAGRAM

(43W30645-14/15)

5



TRANSMITTER UNIT Z3



TRANSMITTER UNIT Z4

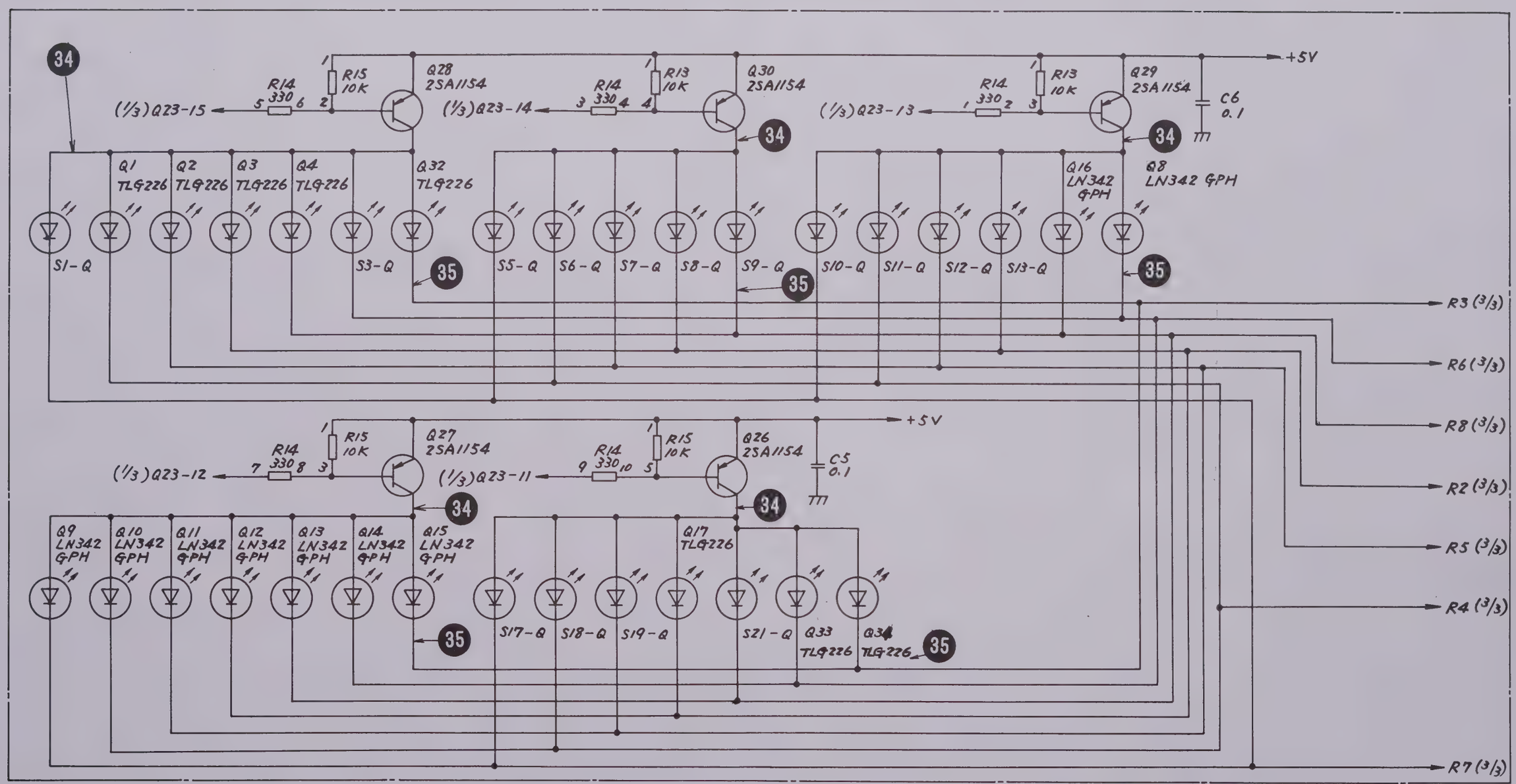
Component List reference (Table 4-4)

FRONT PANEL CIRCUIT
CIRCUIT DIAGRAM

(43W30646-1/3)

6

EXTERNAL 1M-50M	F1	F2	F3	F4	44.736M	MODULATION OFF	PRBS	1111	1100	1010	FRAMED	OFF	EXTERNAL BIT	BIT	BIPOLAR V	SINGLE	10^{-2}



10^{-3}	10^{-4}	10^{-5}	10^{-6}	10^{-7}	10^{-8}	10^{-9}	HIGH	DSX-3	LOW	REMOTE	PANEL LOCK	MODULATION EXT	MODULATION INT

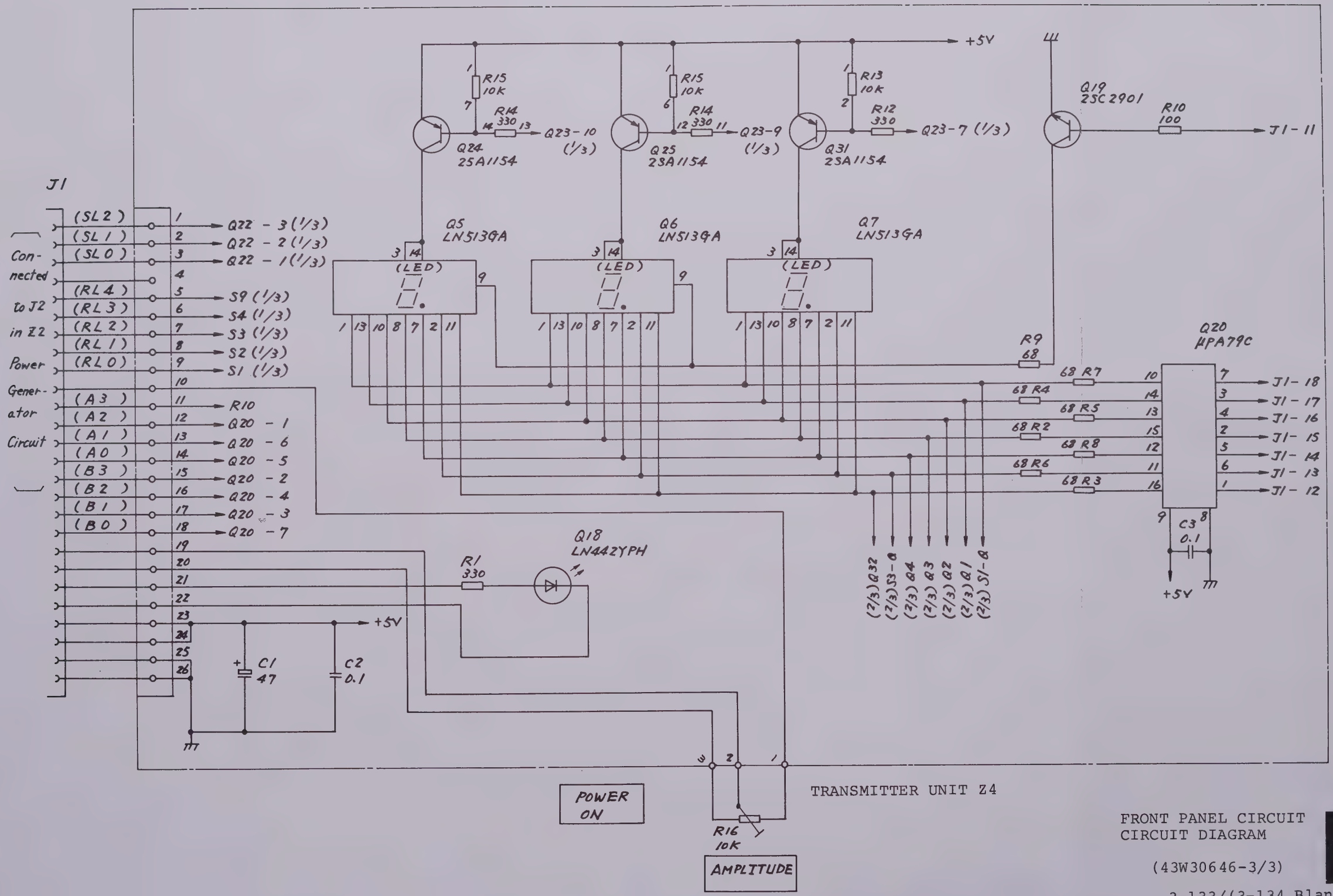
TRANSMITTER UNIT Z4

FRONT PANEL CIRCUIT
CIRCUIT DIAGRAM

(43W30646-2/3)

6

JITTER
BIT (P-P)

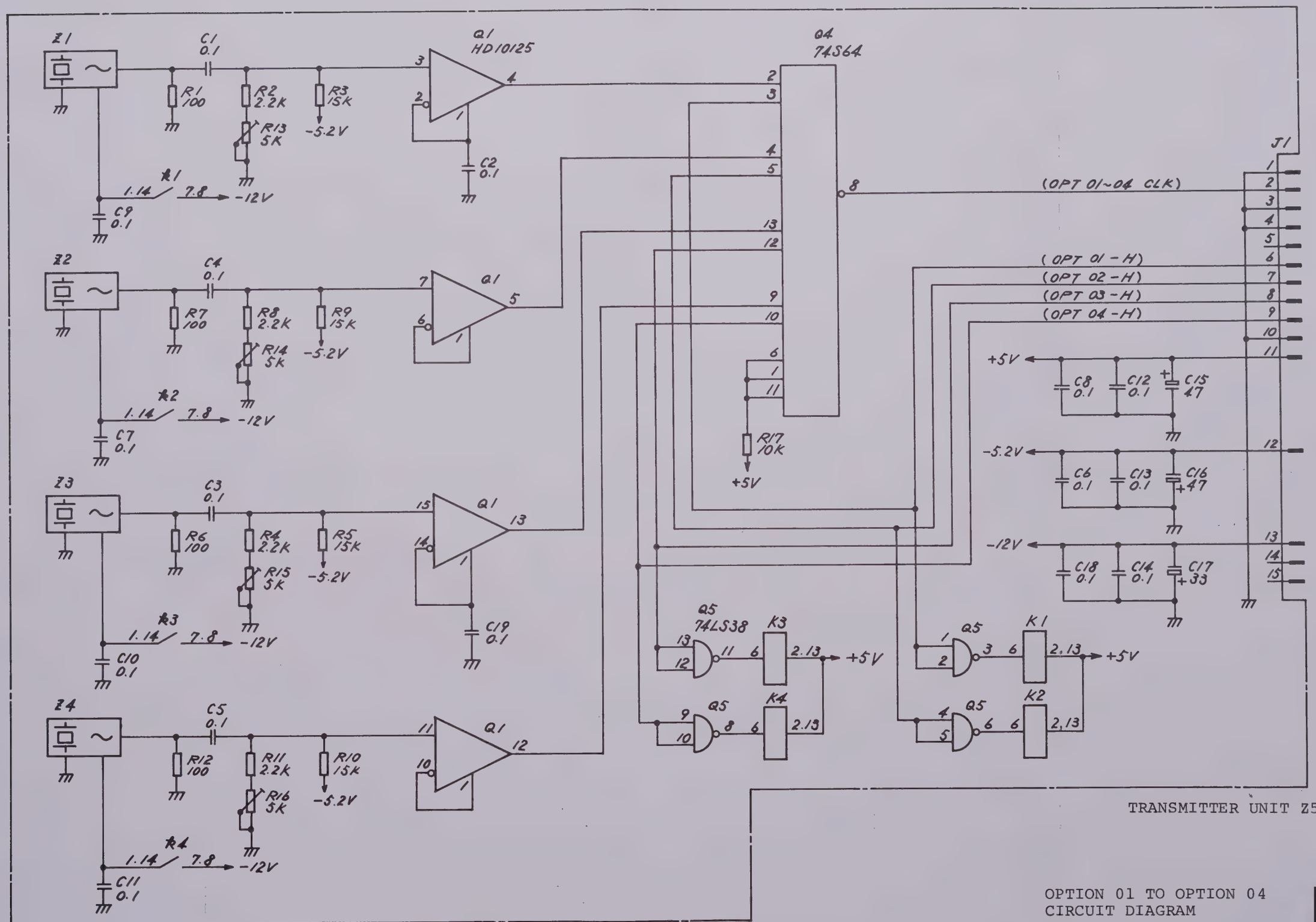


TRANSMITTER UNIT Z4

FRONT PANEL CIRCUIT
CIRCUIT DIAGRAM

(43W30646-3/3)

6



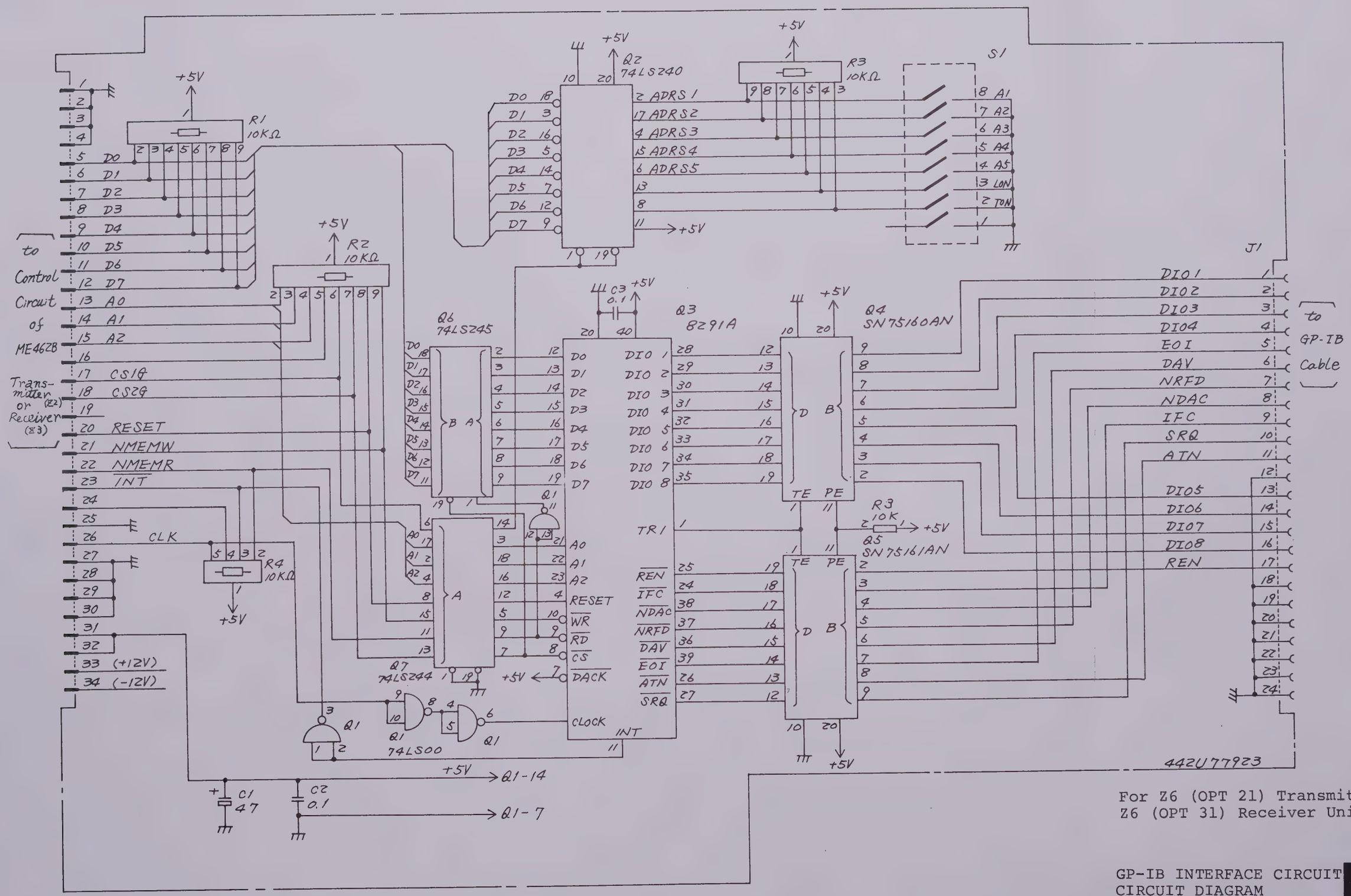
TRANSMITTER UNIT Z5

Component List reference (Table 4-5)

OPTION 01 TO OPTION 04
CIRCUIT DIAGRAM

(43W32137-1/1)

7



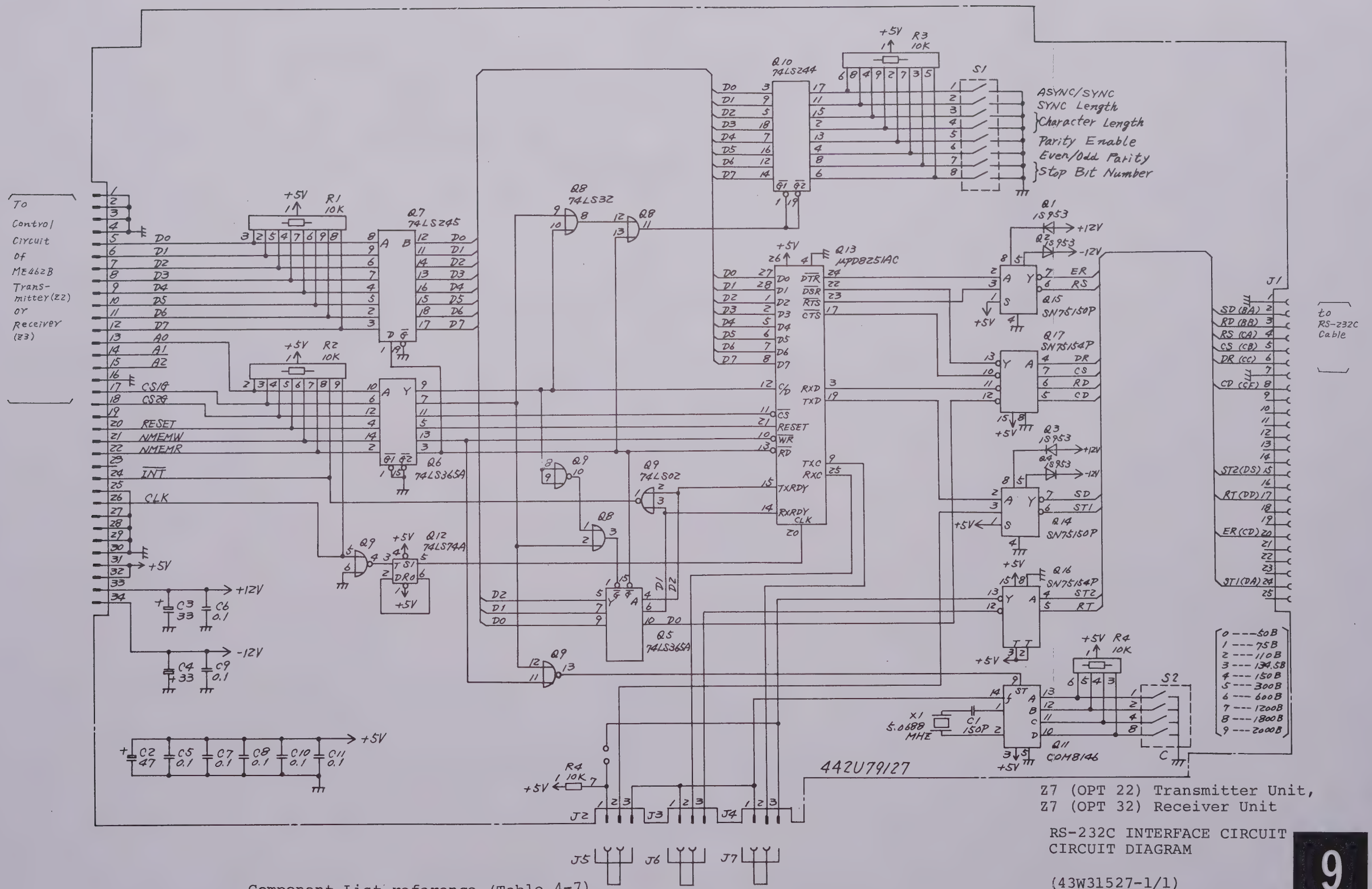
For Z6 (OPT 21) Transmitter,
Z6 (OPT 31) Receiver Unit

Component List reference (Table 4-6)

GP-IB INTERFACE CIRCUIT
CIRCUIT DIAGRAM

(43W30672-1/1)

8



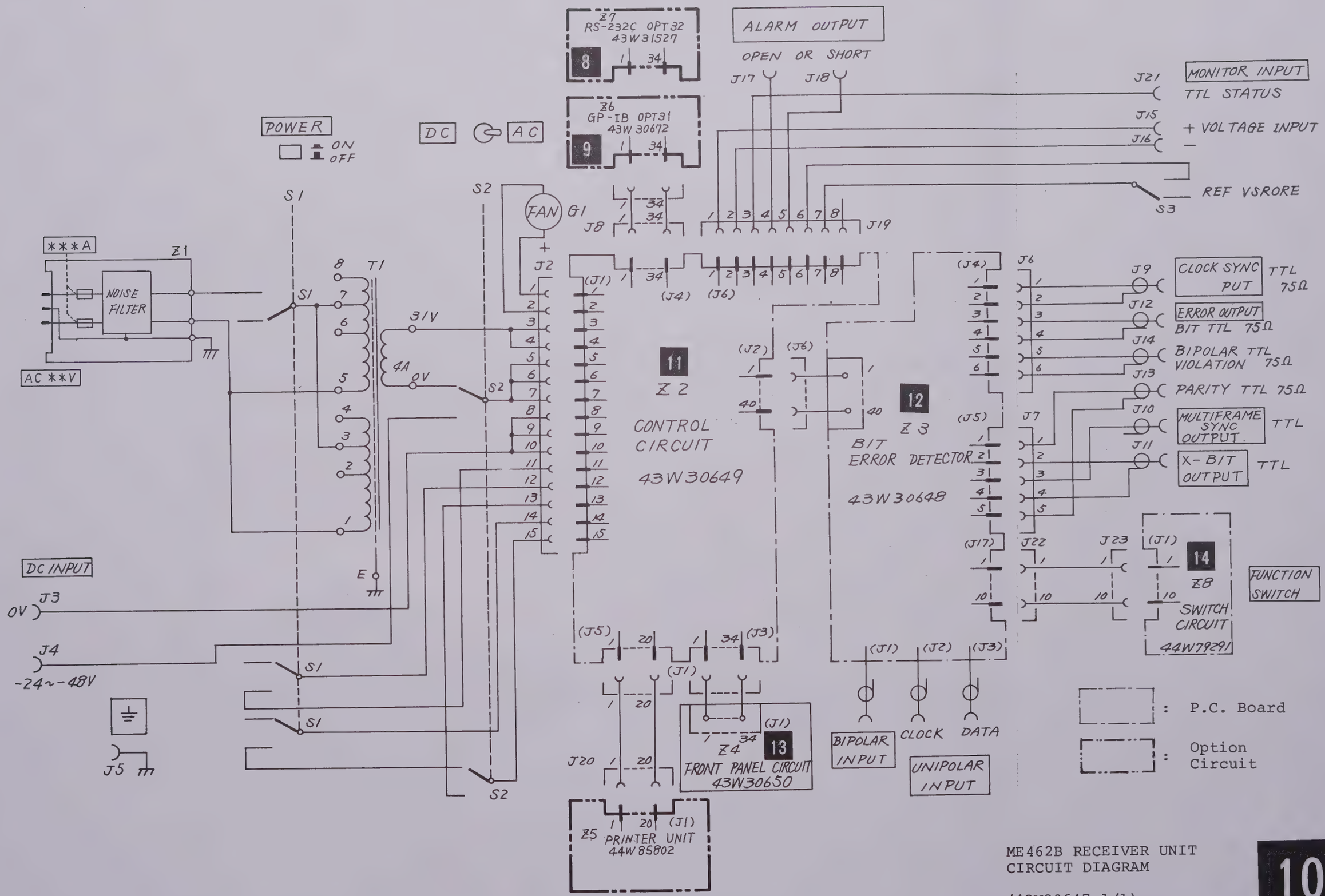
Component List reference (Table 4-7)

Z7 (OPT 22) Transmitter Unit,
Z7 (OPT 32) Receiver Unit

RS-232C INTERFACE CIRCUIT
CIRCUIT DIAGRAM

(43W31527-1/1)

9

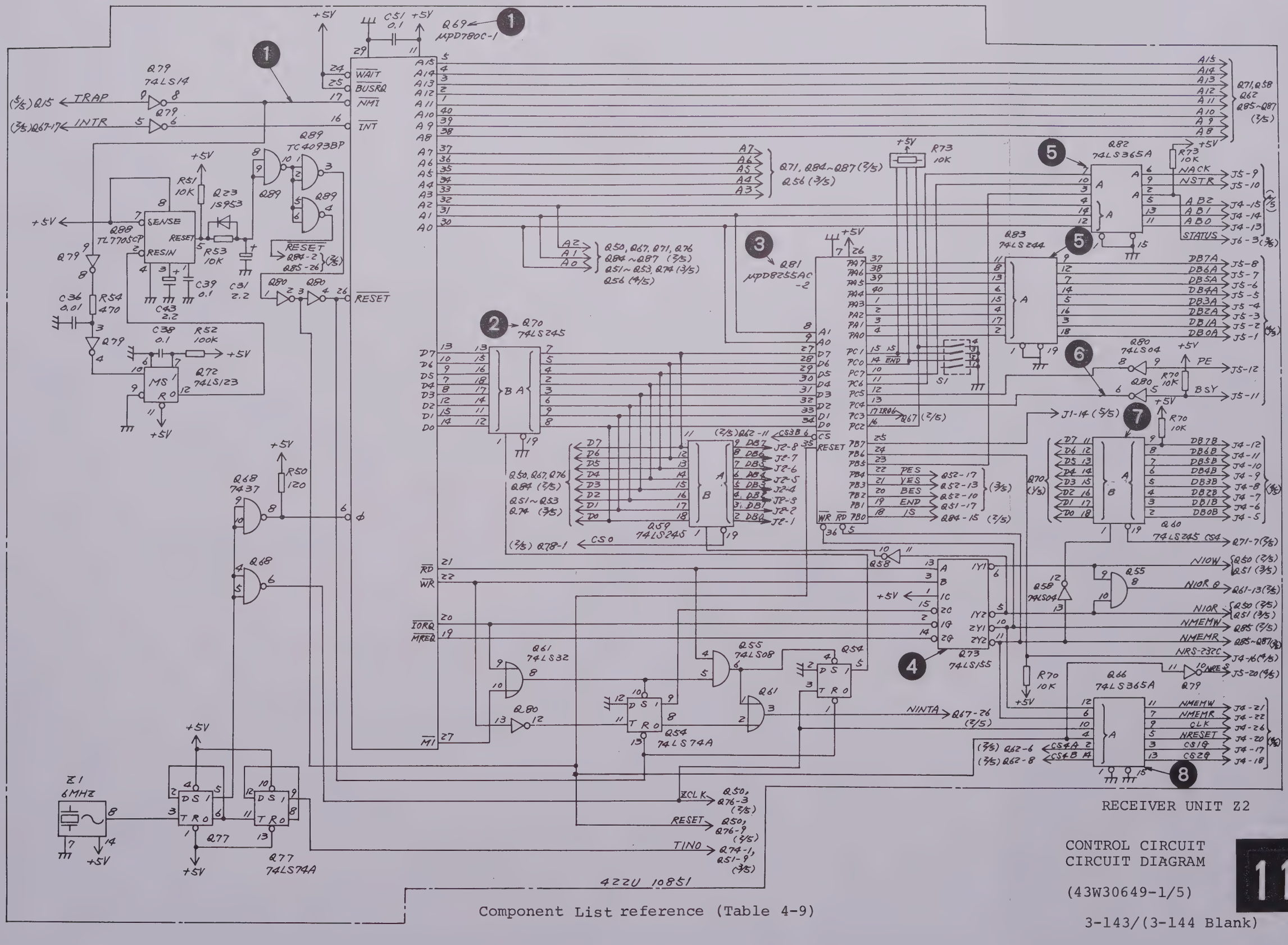


ME462B RECEIVER UNIT
CIRCUIT DIAGRAM

(43W30647-1/1)

10

Component List reference (Table 4-8)



Component List reference (Table 4-9)

RECEIVER UNIT Z2

CONTROL CIRCUIT
CIRCUIT DIAGRAM

(43W30649-1/5)

11

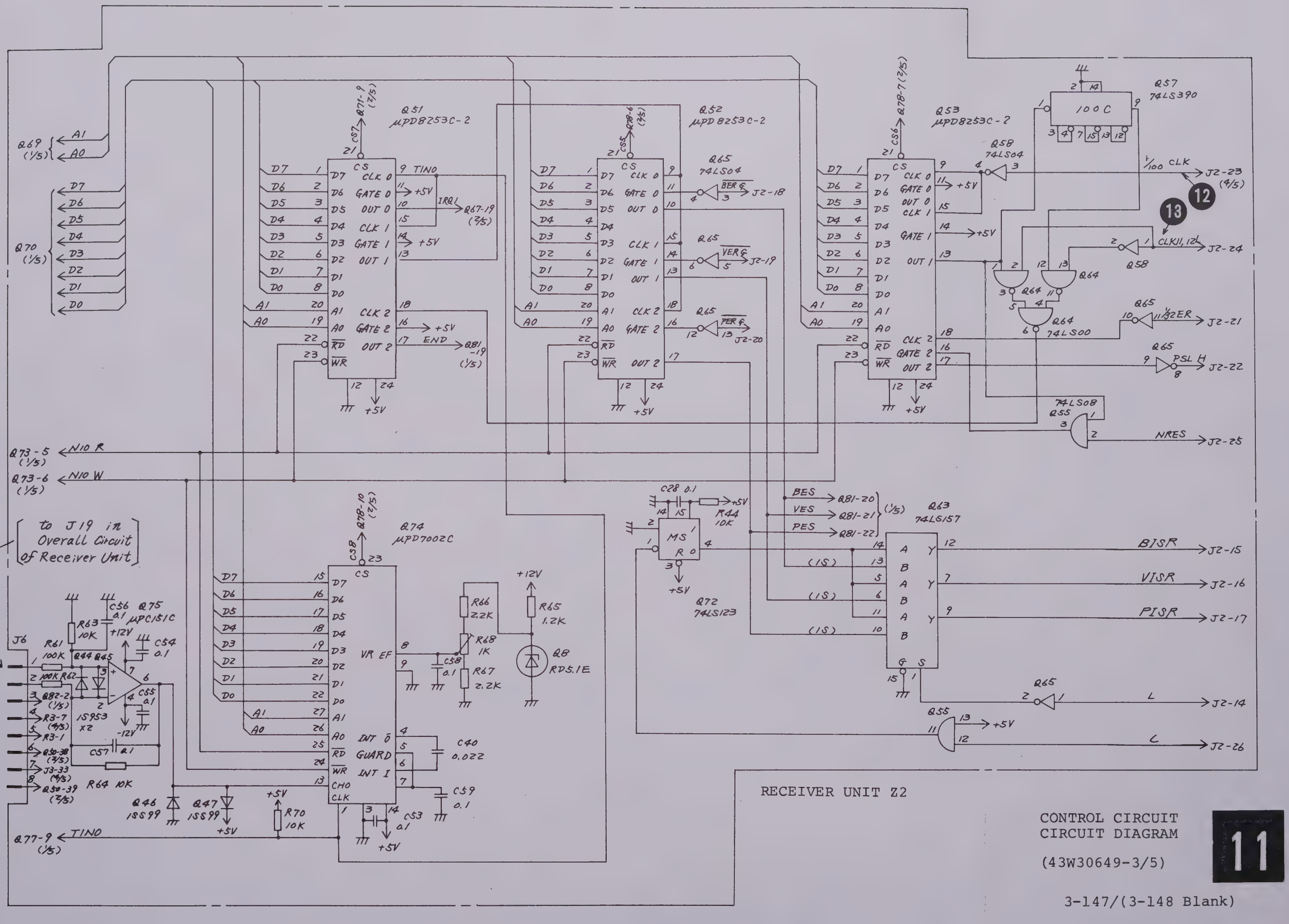
RECEIVER UNIT Z2

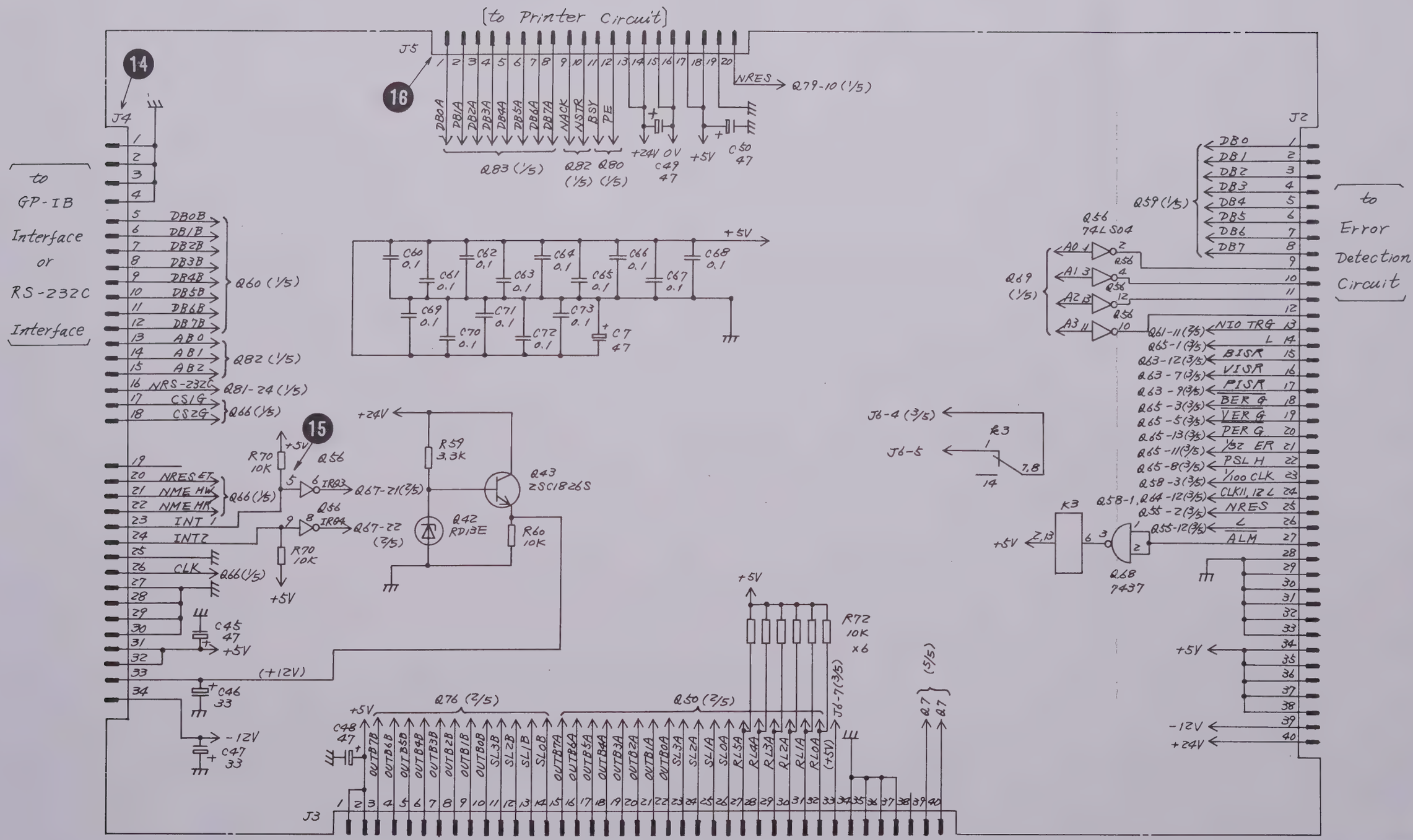
CONTROL CIRCUIT
CIRCUIT DIAGRAM

(43W30649-2/5)

11

422U10851

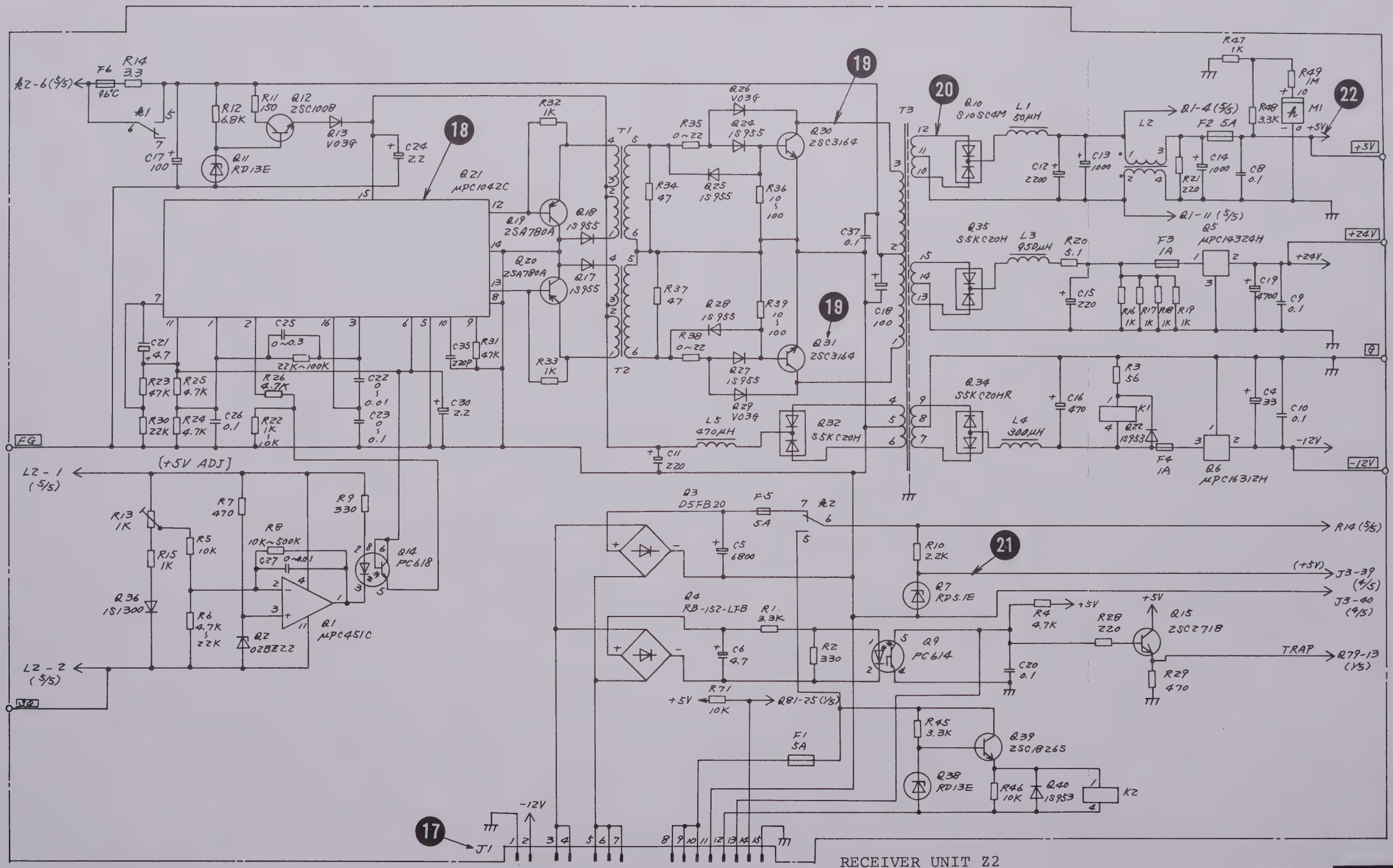

Q51 μPD8253C-2
Q52 μPD8253C-2
Q53 μPD8253C-2
Q57 74LS390
Q58 74LS04
Q65 74LS04
Q64 74LS00
Q55 74LS08
Q63 74LS157
Q72 74LS123
Q74 μPD7002C
Q75 μPC151C
Q8 RD5.1E
Q69 (1/5)
Q70 (1/5)
Q71-9 (2/5)
Q78-6 (2/5)
Q78-7 (2/5)
Q78-10 (2/5)
Q77-9 (1/5)
Q73-5 (1/5)
Q73-6 (1/5)
Q82-2 (1/5)
R3-7 (4/5)
R3-1
Q50-38 (4/5)
J3-33 (4/5)
Q50-39 (2/5)
Q81-19 (1/5)
Q67-19 (2/5)
Q81-20
Q81-21
Q81-22
(1/5)
J2-23 (4/5)
J2-24
J2-21
J2-22
J2-18
J2-19
J2-20
J2-15
J2-16
J2-17
J2-14
J2-26
J2-25
to J19 in Overall Circuit of Receiver Unit
RECEIVER UNIT Z2
CONTROL CIRCUIT
CIRCUIT DIAGRAM
(43W30649-3/5)
11
3-147/(3-148 Blank)

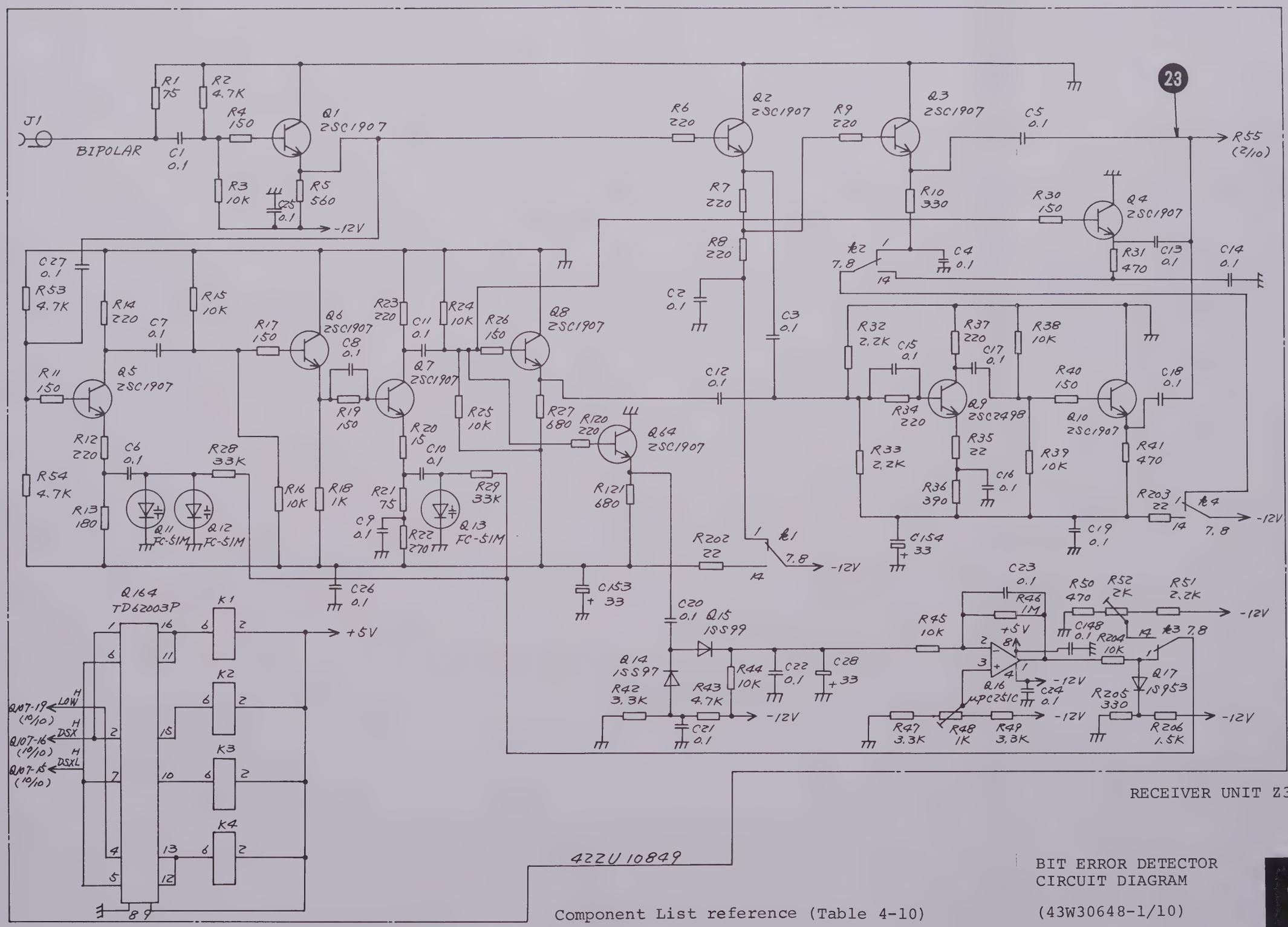


CONTROL CIRCUIT
CIRCUIT DIAGRAM

(43W30649-4/5)

11


RECEIVER UNIT Z2
CONTROL CIRCUIT
CIRCUIT DIAGRAM
(43W30649-5/5)
11
3-151/(3-152 Blank)
to J2 in Circuit Diagram 10 of ME462B Receiver
Q21 MPC1042C
Q19 2SA780A
Q20 2SA780A
Q18 IS955
Q17 IS955
Q26 V03G
Q24 IS955
Q25 IS955
Q28 IS955
Q27 IS955
Q29 V03G
Q30 2SC3164
Q31 2SC3164
Q32 S5KC20H
Q10 S10SC4M
Q35 S5KC20H
Q34 S5KC20HR
Q5 MPC1432H
Q6 MPC1631ZH
Q22 IS953
Q3 D5FB20
Q4 RB-152-LFB
Q1 μPC451C
Q2 02BZ2.2
Q14 PC618
Q36 IS1300
Q7 RD5.1E
Q9 PC614
Q15 2SC2718
Q39 2SC1826S
Q38 RD13E
Q40 IS953
T1
T2
T3
L1 50μH
L2
L3 950μH
L4 300μH
L5 470μH
M1
K1
K2
F1 5A
F2 5A
F3 1A
F4 1A
F5 5A
F6 95°C
J1
J3-39 (4/5)
J3-40 (4/5)
TRAP
+5V
+24V
-12V
FG
(+5V ADJ)
Z2-1 (5/5)
Z2-2 (5/5)
Z2-6(5/5)
Q1-4(5/5)
Q1-11(5/5)
Q81-25(1/5)
R14(5/5)
Q79-13 (1/5)



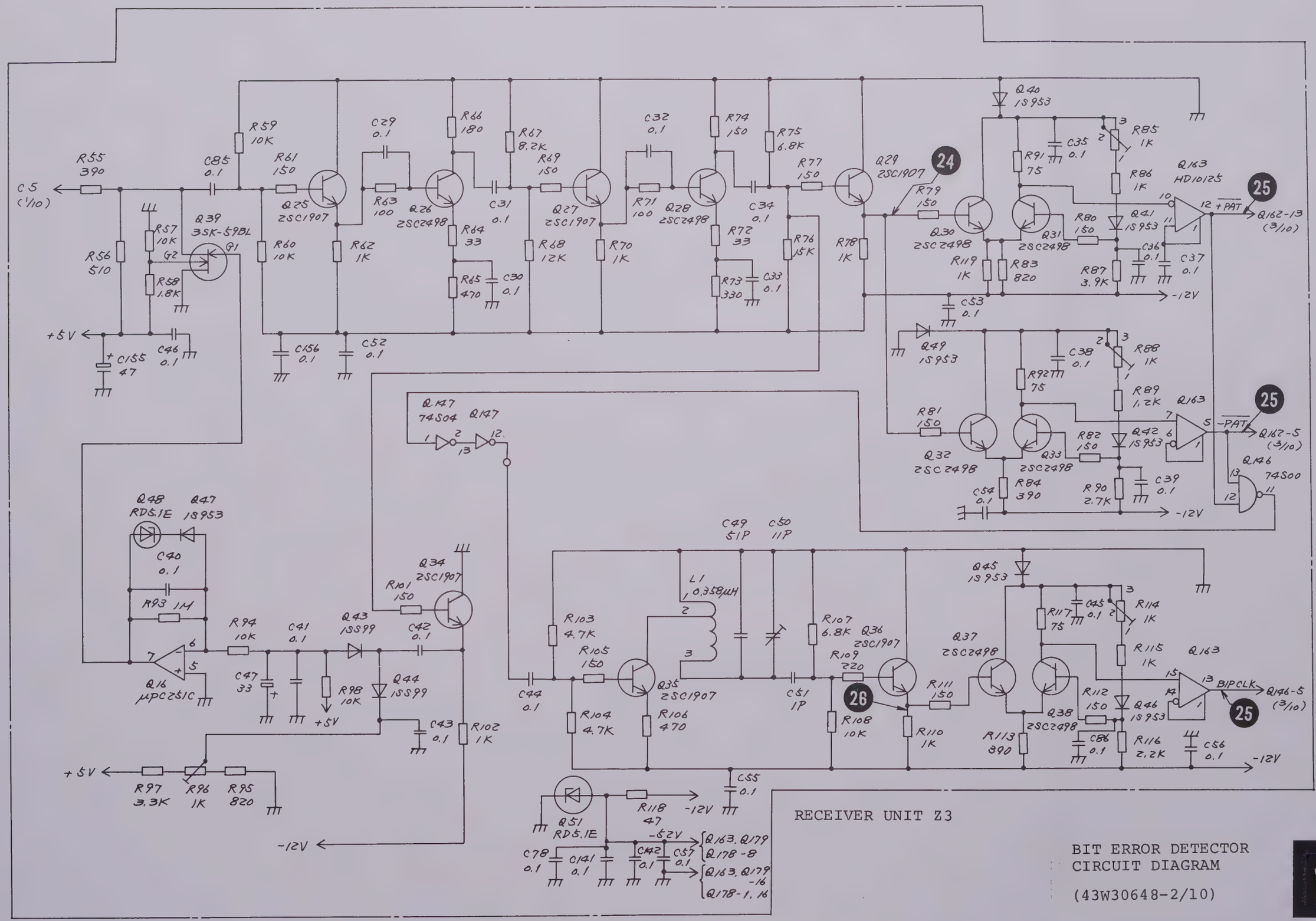
RECEIVER UNIT Z3

Component List reference (Table 4-10)

BIT ERROR DETECTOR
CIRCUIT DIAGRAM

(43W30648-1/10)

12

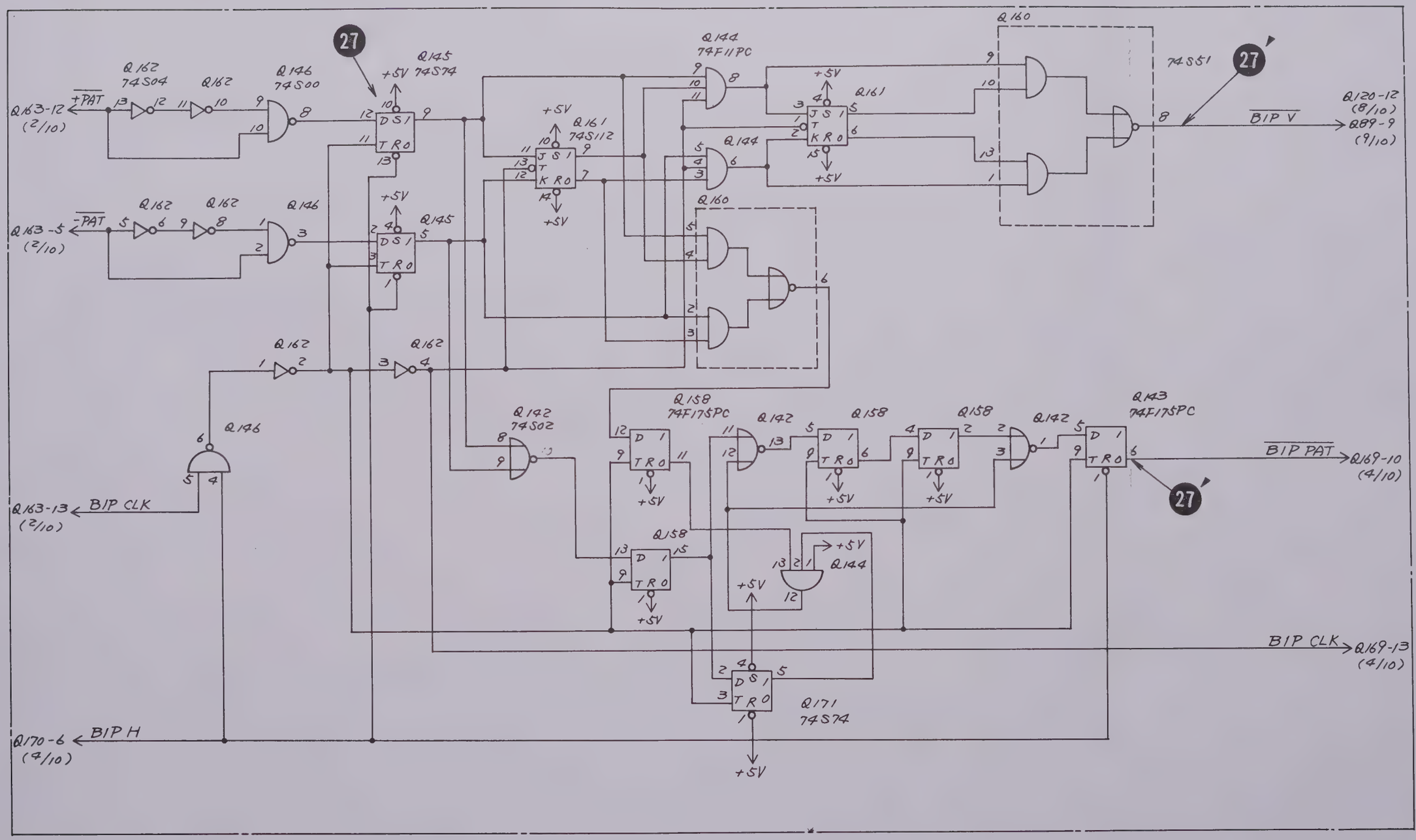


RECEIVER UNIT Z3

BIT ERROR DETECTOR
CIRCUIT DIAGRAM

(43W30648-2/10)

12

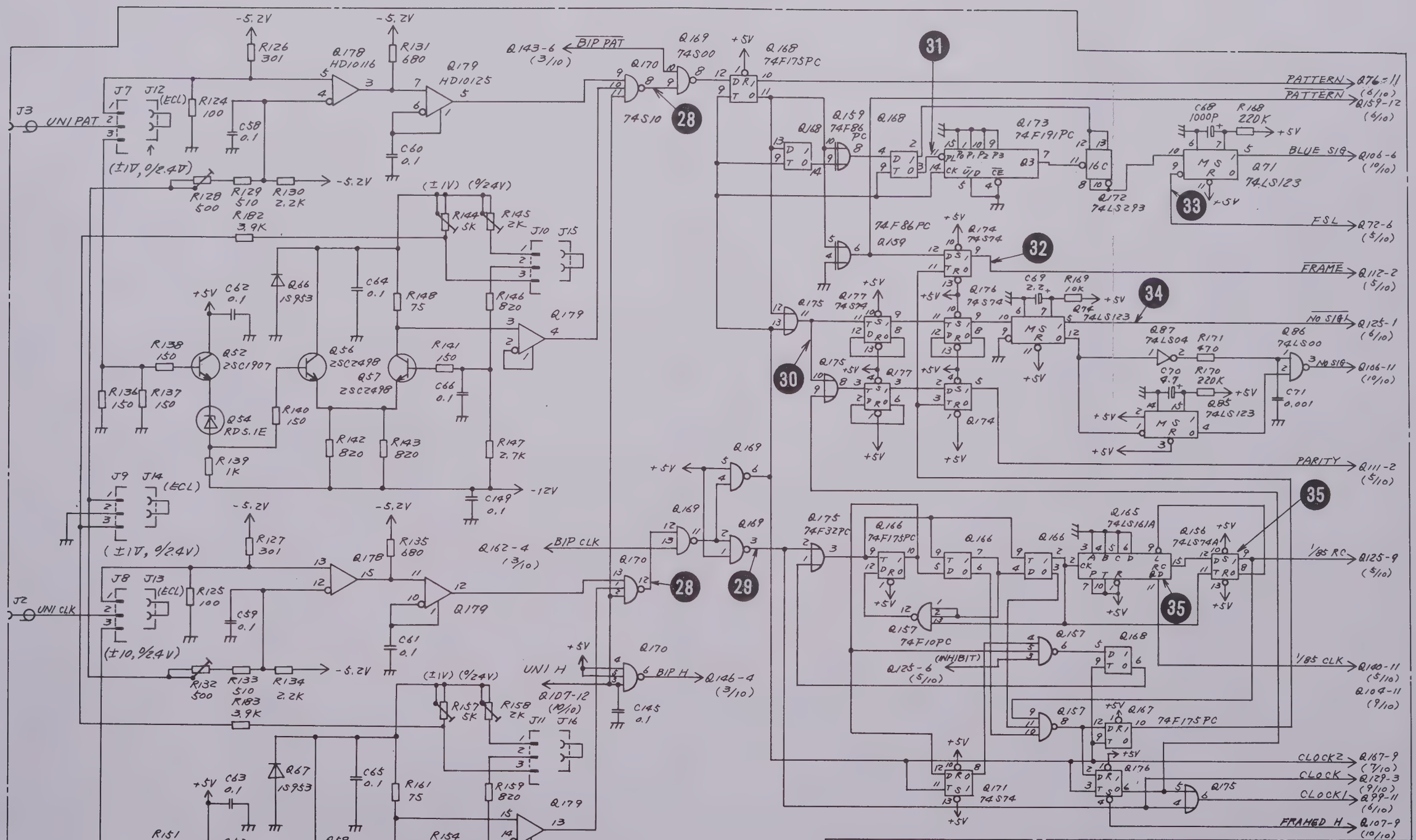


RECEIVER UNIT Z3

BIT ERROR DETECTOR
CIRCUIT DIAGRAM

(43W30648-3/10)

12

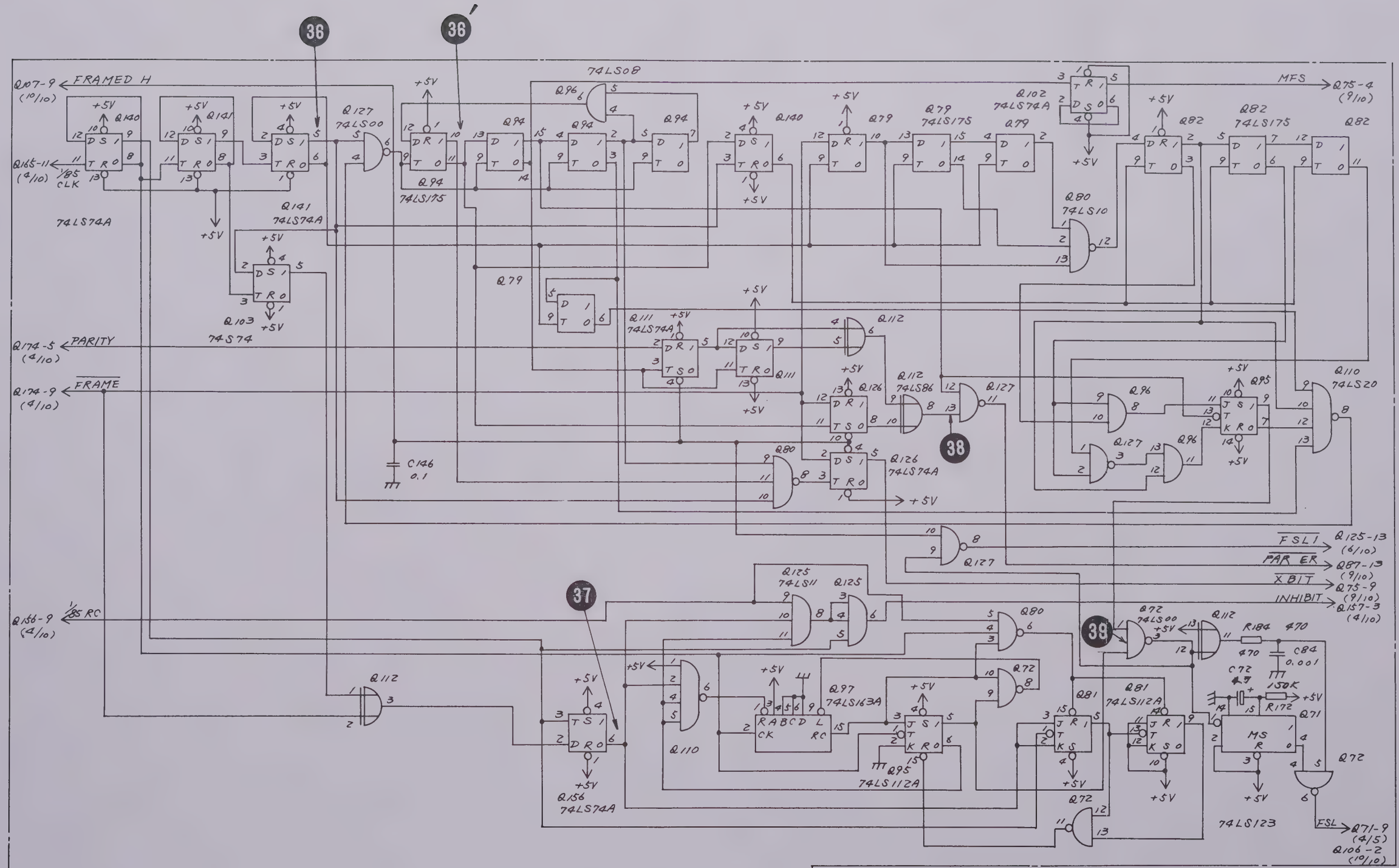


RECEIVER UNIT Z3

BIT ERROR DETECTOR
CIRCUIT DIAGRAM

(43W30648-4/10)

12

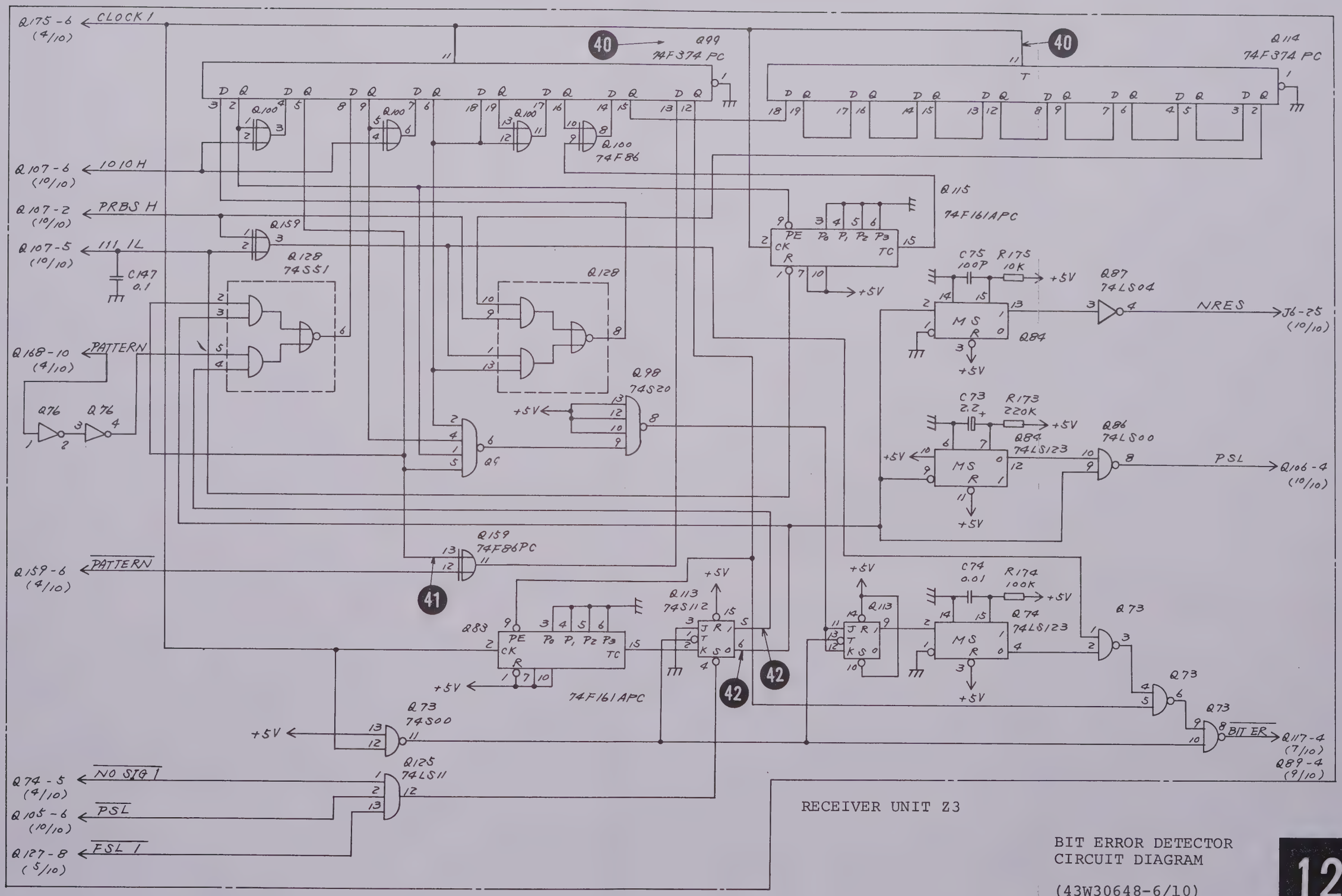


RECEIVER UNIT Z3

BIT ERROR DETECTOR
CIRCUIT DIAGRAM

(43W30648-5/10)

12

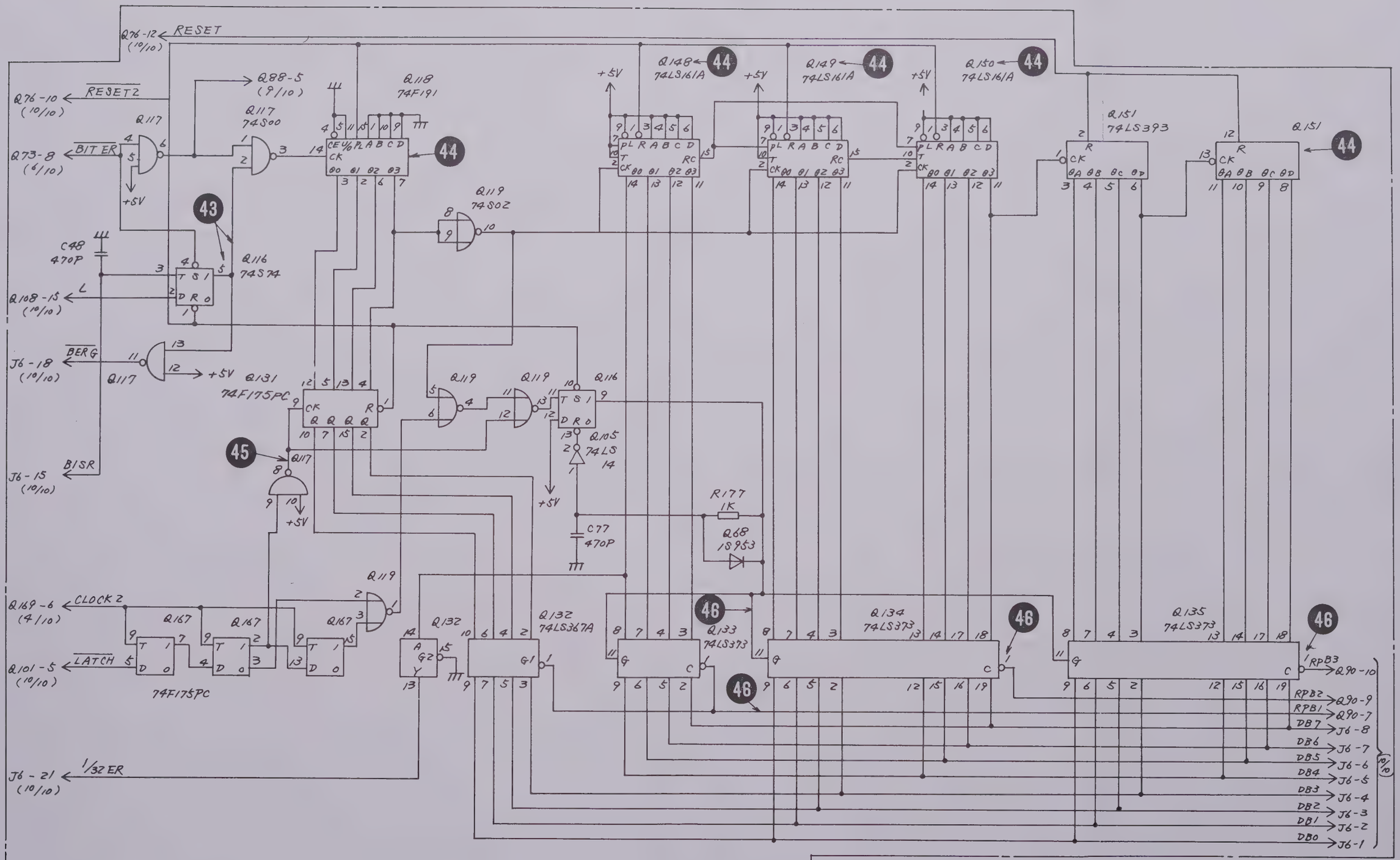


RECEIVER UNIT Z3

BIT ERROR DETECTOR
CIRCUIT DIAGRAM

(43W30648-6/10)

12

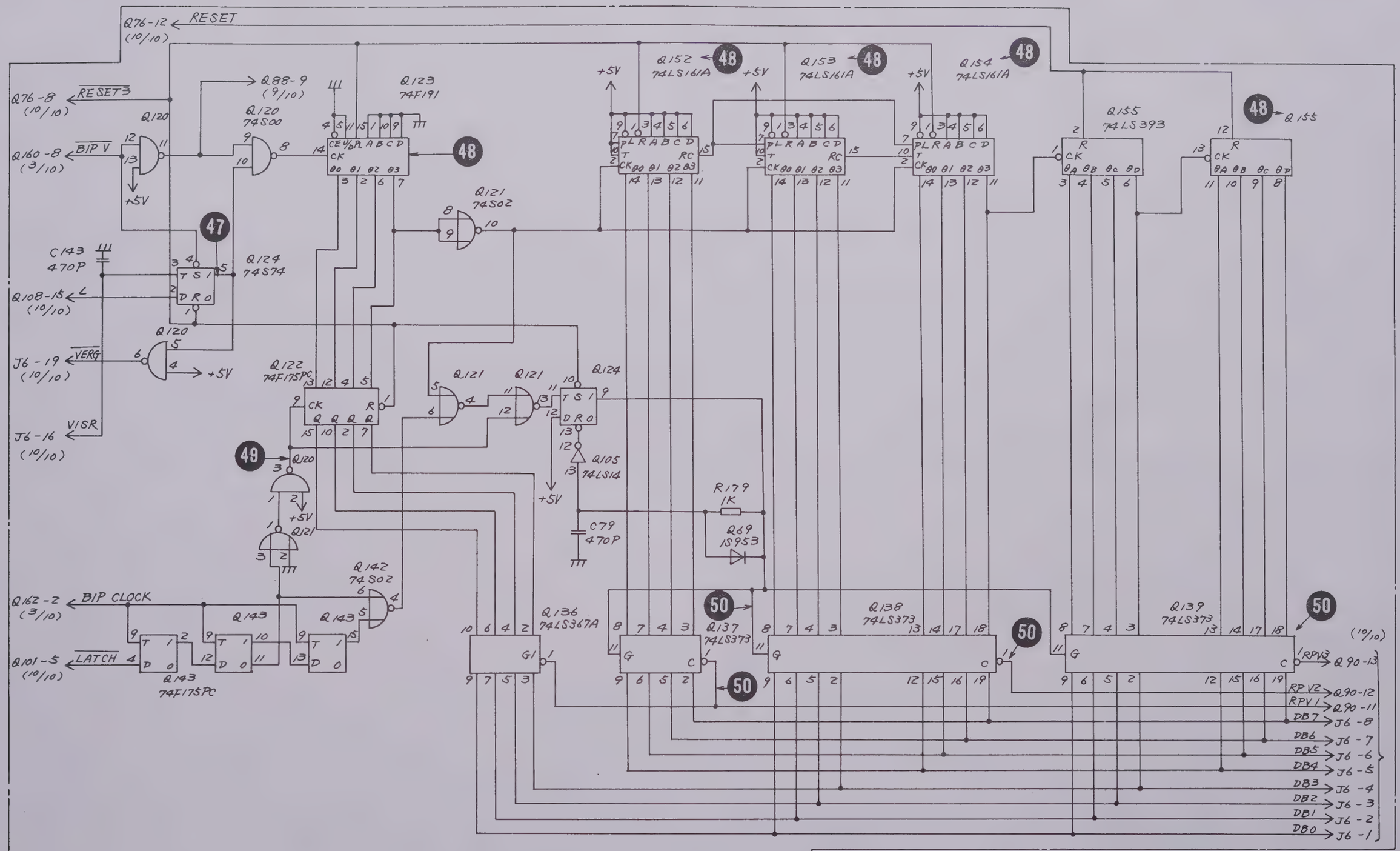


RECEIVER UNIT Z3

BIT ERROR DETECTOR
CIRCUIT DIAGRAM

(43W30648-7/10)

12

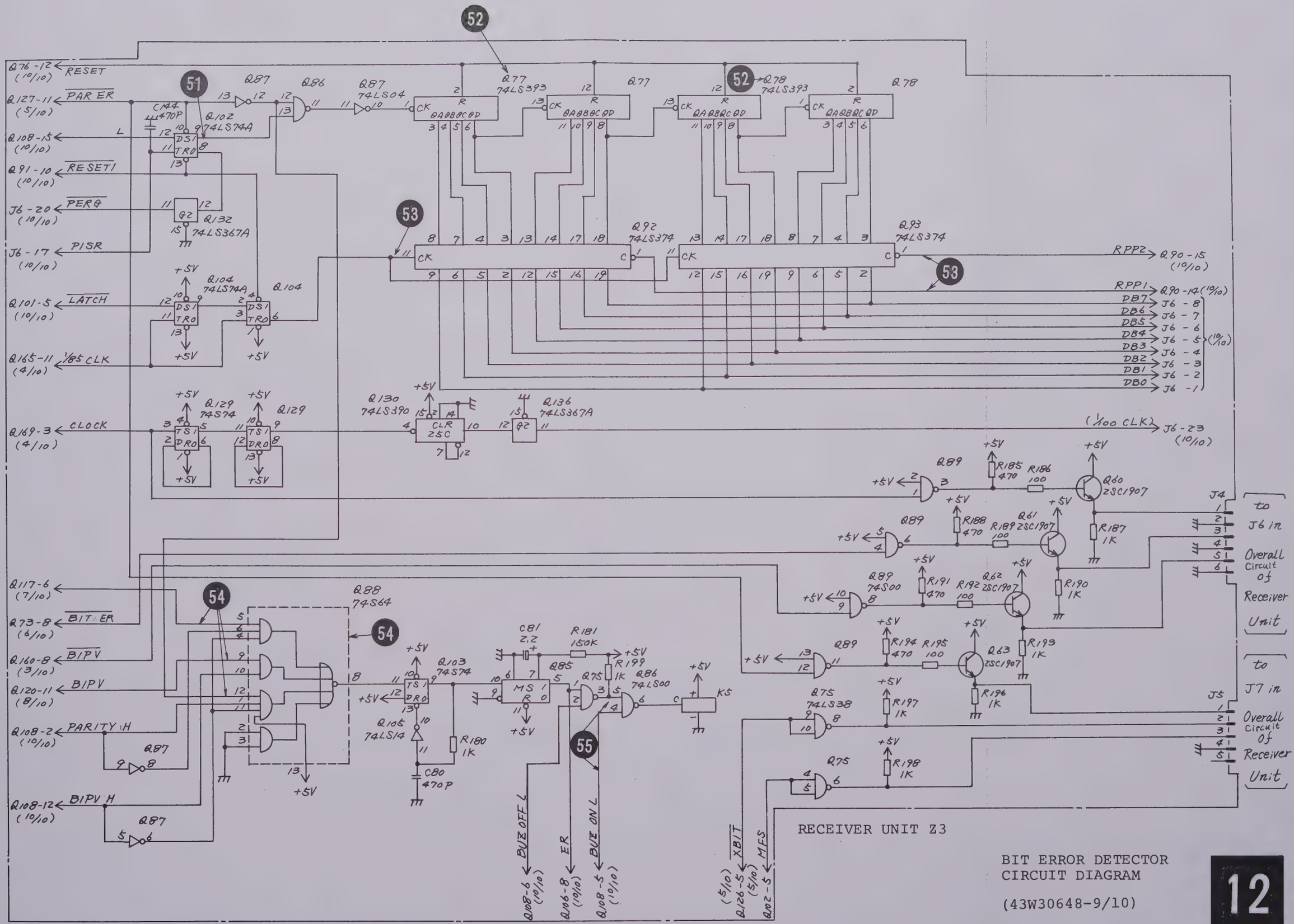


RECEIVER UNIT Z3

BIT ERROR DETECTOR
CIRCUIT DIAGRAM

(43W30648-8/10)

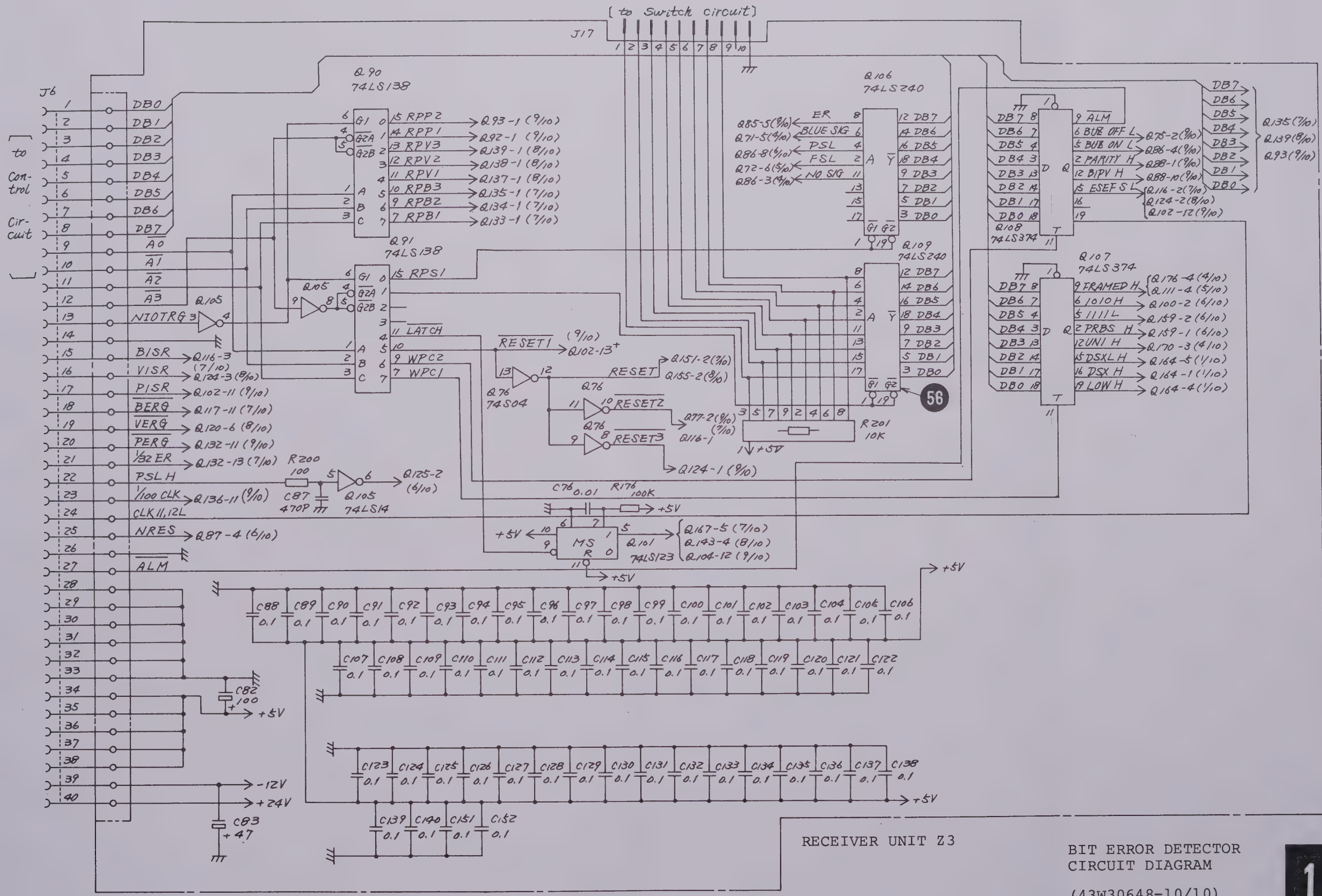
12



BIT ERROR DETECTOR
CIRCUIT DIAGRAM

(43W30648-9/10)

12

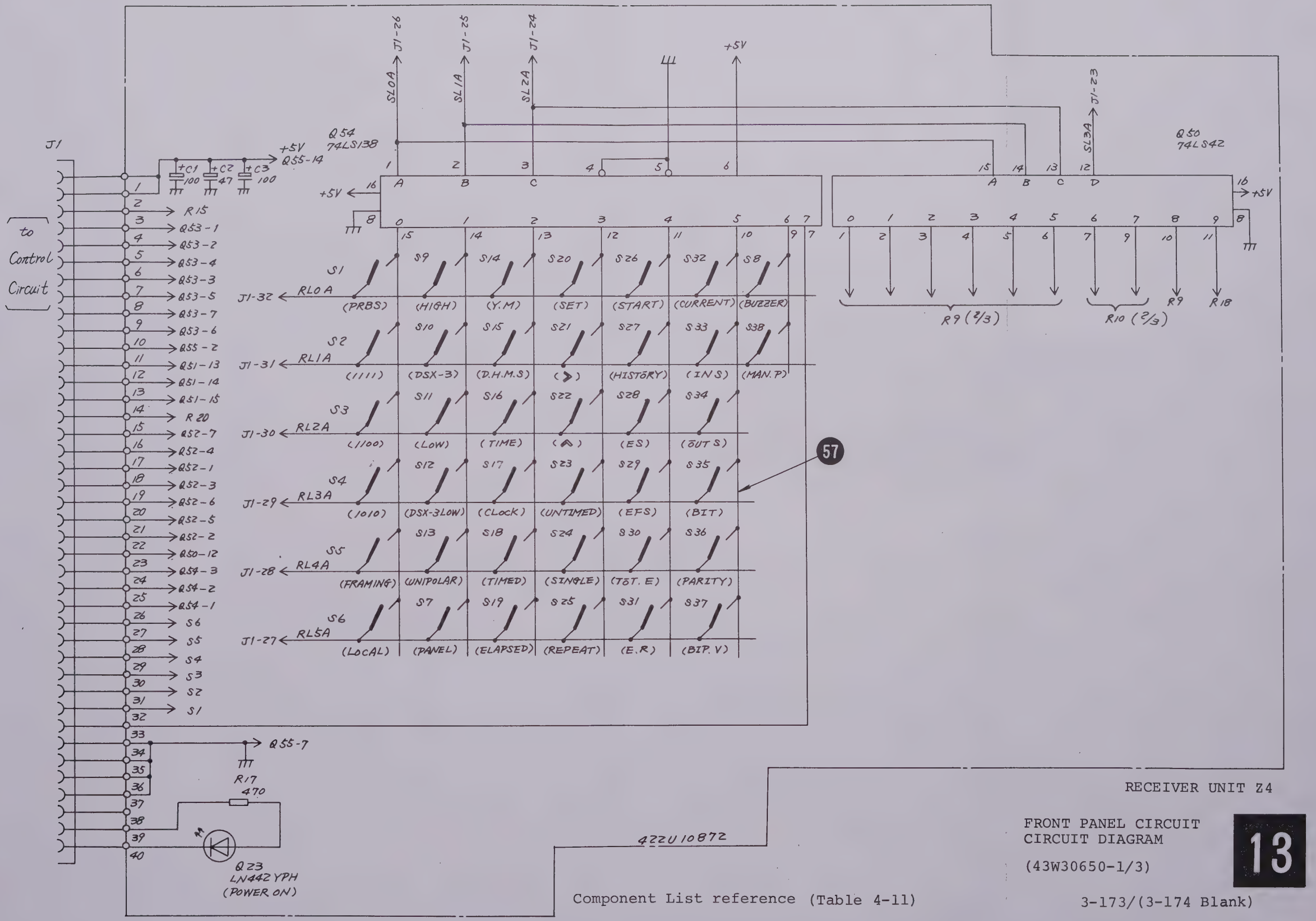


RECEIVER UNIT Z3

BIT ERROR DETECTOR
CIRCUIT DIAGRAM

(43W30648-10/10)

12



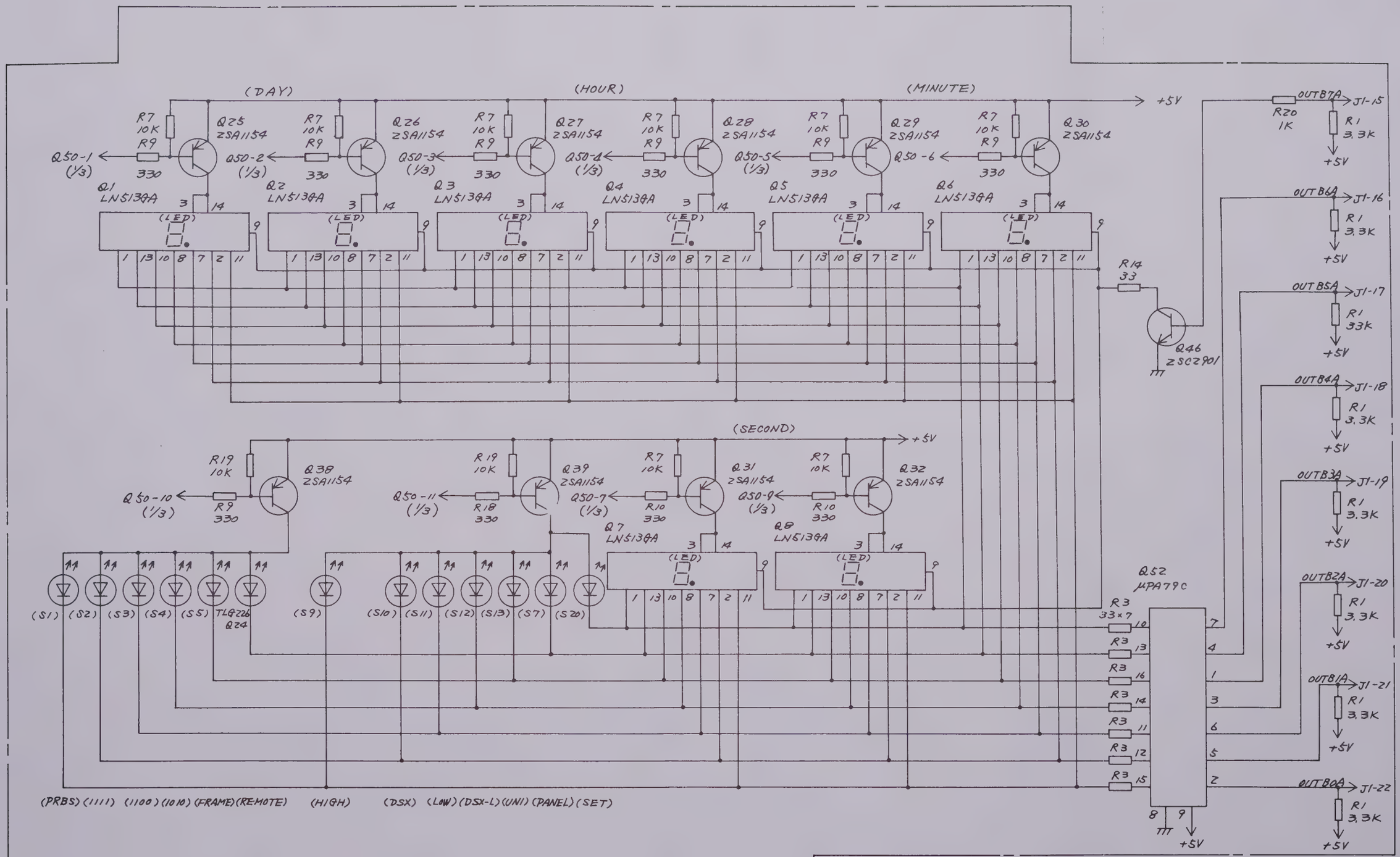
RECEIVER UNIT Z4

FRONT PANEL CIRCUIT
CIRCUIT DIAGRAM

(43W30650-1/3)

13

Component List reference (Table 4-11)

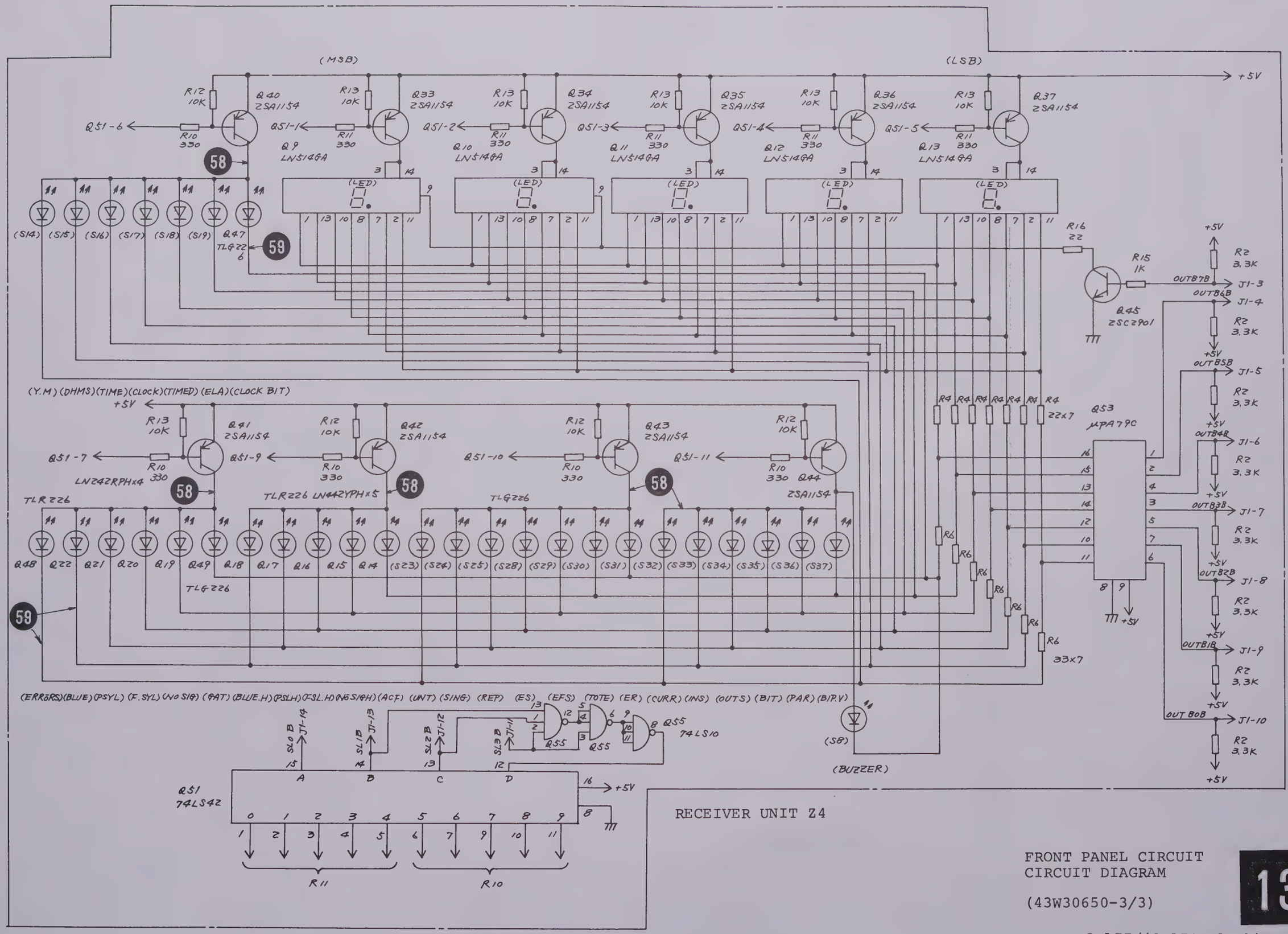


RECEIVER UNIT Z4

FRONT PANEL CIRCUIT
CIRCUIT DIAGRAM

(43W30650-2/3)

13

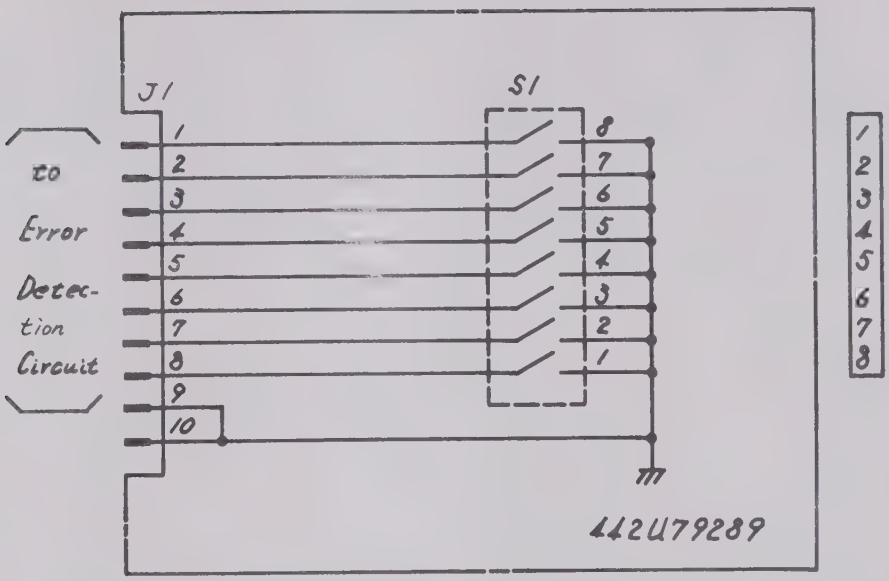


RECEIVER UNIT Z4

FRONT PANEL CIRCUIT
CIRCUIT DIAGRAM

(43W30650-3/3)

13



Component List reference (Table 4-12)

RECEIVER UNIT Z8

SWITCH CIRCUIT
CIRCUIT DIAGRAM

(44W79291-1/1)

14

SECTION 4

REPLACEABLE PARTS

4.1 Introduction

This section contains information relative to ordering replacement components. The following table shows circuit references (hereinafter CKT REF) and abbreviations used for components given in the component list. In the component list, the quantity of each component is "1" when no quantity is given in the "NOTE" column.

(1) Circuit reference

AT: Attenuator	K: Relay	Q: Transistor, Diode, Rectifier, IC	T: Transformer
C: Capacitor	L: Coil	R: Resistor	V: Neon lamp, Vaccumtube
F: Fuse	M: Meter, timer	S: Switch	Z: Unit
G: Fan	P: Lamp		
J: Jack, plug connector			

(2) Abbreviations

A	: amperes	J-FET	: junction FET	PNP	: positive-negative-positive
Att, R var	: attenuator variable using film resistive elements	k	: kilo ($\times 10^{3}$)	p-p, pp	: peak to peak value
BL	: boundary layer	LED	: light emitting diode	RFC	: RF choke
				R-lamp	: resistor lamp
Cer	: ceramic	M	: mega ($\times 10^{6}$)	rms	: effective value (root means square)
CF	: carbon film	m	: milli ($\times 10^{-3}$)		
Comp	: composition	MF	: metallized film	SBD	: shottky barrier diode
CRT	: cathode-ray tube	MOS-FET	: metal oxide semi-conductor FET	SCR	: sillicon controlled rectifier
		M paper	: metallized paper	Si	: sillicon
Di	: diode	M plast	: metallized plastic film	SRD	: step recovery diode
DIL type	: dual-in line type	Multi	: multiplying		
				Tant	: tantalum
Elect	: electrolyte aluminum	N ch	: N channel	Tr	: transistor
		non-lin	: non-linear taper	Trans	: transformer
F	: farad	Non-pol	: non-polarity		
FET	: field effect transistor	NPN	: negative-positive-negative	μ	: micro ($\times 10^{-6}$)
G	: ground			V	: volt
Ge	: germanium	Ω	: ohms	Var	: variable
H	: henry				
Hz	: hertz	p	: pico ($\times 10^{-12}$)	WW	: wire wound
		Plast	: plastic film		
IC	: integrated circuit	PMTR	: potentiometer	XTAL	: crystal
IEC	: Applicable to IEC Safety Standard				

4.2 Capacitor/Resistor Reading Method

4.2.1 Capacitor

CAPACITANCE — MULTIPLIER

Value in Picofarads (pF)

Number of zero's following the value

EXAMPLES: 103 = 10,000pF = 10^{-8}F or 0.01μF

302 = 3,000pF = $3x10^{-9}$F or 0.003μF

676 = 67,000,000pF = $67x10^{-6}$F or 67μF

(a) Ceramic capacitor, polyester capacitor

Indication	0.5	1	10	101	102	103	104
Capacity	0.5pF	1pF	10pF	100pF	1000pF	0.01μF	0.1μF

Example:

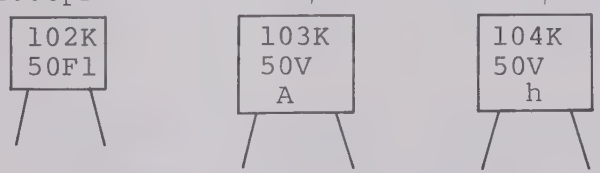
Ceramic Capacitor

1000pF 4700pF 0.5pF 10pF 100pF

Capacity values are always underlined.

Polyester Capacitor

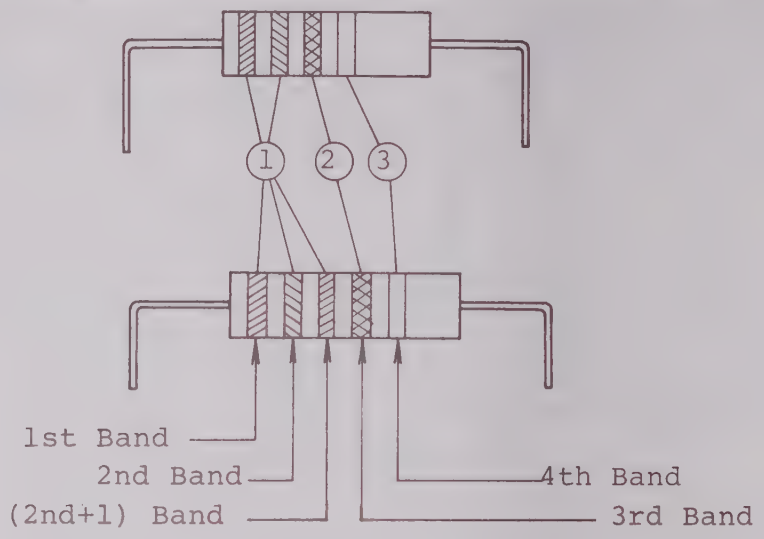
1000pF 0.01μF 0.1μF



(b) Tantalum capacitor. Metallized capacitor and Electrolytic capacitor

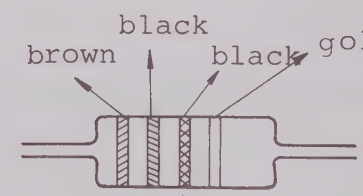
Indication	OR47	010	100	101
Capacity	0.47μF	1μF	10μF	100μF

4.2.2 Resistor



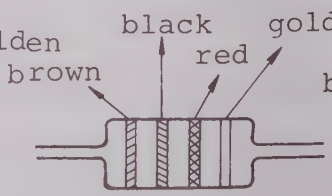
	①		②	③
COLOR	Figure		Multiplier	Tolerance
	1st	2nd	3rd	4th
Black	0	0	$x10^0$	-
Brown	1	1	$x10^1$	-
Red	2	2	$x10^2$	-
Orange	3	3	$x10^3$	-
Yellow	4	4	$x10^4$	-
Green	5	5	$x10^5$	$\pm$0.5%
Blue	6	6	$x10^6$	-
Purple	7	7	$x10^7$	-
Grey	8	8	$x10^8$	-
White	9	9	$x10^9$	-
Gold	-	-	$x10^{-1}$	$\pm$5%
Silver	-	-	$x10^{-2}$	$\pm$10%
-----	-	-		$\pm$20%

For Example:



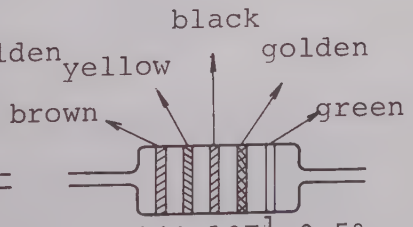
$10x10^0\pm5\%$

10Ω,±5%



$10x10^2\pm5\%$

1kΩ,±5%



$140x10^{-1}\pm0.5\%$

14.0Ω,±0.5%

4.3 Ordering Information

When ordering components, please give the following information by referring to the Component List.

	Item	Example
(1)	Name of instrument	DS-3 TRANSMISSION ANALYZER ME462B RECEIVER
(2)	Name of component	Component List of Control Circuit (Z2)
(3)	CKT REF	C38
(4)	Name of component	ECQ-M1H 104KZ Note: The part name is given in parentheses ( ) in the Component List. Components with asterisks * require factory adjustment upon repairing. When ordering a component or components with asterisks, give a full description of the component.
(5)	Quantity	1
(6)	Serial No. of instrument	M31257

4.4 Component List

The Component List of ME462B follows from Table 4-1 to Table 4-12 for the Transmitter and the Receiver. (Including for OPT.)

Table No.	Name	Schematic No.
Table 4-1	Transmitter Unit	3
Table 4-2	(Transmitter, Z2) Power Supply	4
Table 4-3	(Transmitter, Z3) PATTERN Generator	5
Table 4-4	(Transmitter, Z4) Front Panel	6
Table 4-5	(Transmitter, Z5) OPTION 01 to 04	7
Table 4-6	(Transmitter, Z6, or Receiver, Z6) GP-IB Interface	8
Table 4-7	(Transmitter, Z7, or Receiver, Z7) RS-232C Interface	9
Table 4-8	Receiver Unit	10
Table 4-9	(Receiver, Z3) ERROR DETECTION	11
Table 4-10	(Receiver, Z2) CONTROL Circuit	12
Table 4-11	(Receiver, Z4) Front Panel	13
Table 4-12	(Receiver, Z8) Switch Circuit	14

Table 4-1 COMPONENT LIST FOR ME462B TRANSMITTER UNIT
(Transmitter Unit Circuit Diagram 3)

CKT REF	DESCRIPTION	RATING		NOTE
G 1	Fan,(FB08B12L)			
J 1	Not assigned			
J 2	Socket,(DF1-10S-2.5R24)			
J 3	Terminal,(34E5848)			
J 4	Terminal,(34E5848)			
J 5	Terminal,(A-12)			
J 6	Socket,(DF1-15S-2.5R24)			
J 7	Receptacle,(BNC-R-NI)			
J 8	Receptacle,(BNC-R-NI)			
J 9	Receptacle,(BNC-R-NI)			
J10	Receptacle,(BNC-R-NI)			
J11	Receptacle,(BNC-R-NI)			
J12	Connector,(HIF35-34D-AA40S)			
R 1	CF,(ARD25T391J)	390Ω,±5%,1/4W		
S 1	Switch,(ESB-9997S16)			
S 2	Toggle,(8E3011)			
S 3	Toggle,(8A2011)			
T 1	Power trans,(44T80042)			
Z 1	Inlet			****A (See Note.)
Z 2	POWER SUPPLY CIRCUIT			
Z 3	PATTERN GENERATOR CIRCUIT			
Z 4	FRONT PANEL CIRCUIT			
Z 5	CLOCK CIRCUIT			OPT 01 to 04
Z 6	GP-IB INTERFACE			OPT 21
Z 7	RS-232C INTERFACE			OPT 22

( ): Manufacturer's part number
* : Selected at factory

Table 4-2 COMPONENT LIST FOR POWER SUPPLY CIRCUIT
(422U10935 P.C. BOARD), (Transmitter Z2 Circuit Diagram 4)

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C 2	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C 3	Elect,(CE04C1C330)	33μF,±20%,16V		
C 4	Elect,(CE04C1C330)	33μF,±10%,16V		
C 5	Elect,(ECEM80R682L)	6800μF,±15%,80V		
C 6	Not assigned			
C 7	Not assigned			
C 8	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C 9	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C10	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C11	Elect,(ECEA1HG221S)	220μF,+50/-20%,50V		
C12	Elect,(ECEA1CG222S)	2200μF,+50/-20%,16V		
C13	Elect,(ECEA1CG102S)	1000μF,+50/-20%,16V		
C14	Elect,(ECEA1AG102S)	1000μF,+50/-20%,10V		
C15	Elect,(ECEA1HG471S)	470μF,+50/-20%,50V		
C16	Elect,(ECEA1HG471S)	470μF,+50/-20%,50V		
C17	Elect,(CE04C1J101)	100μF,±20%,63V		
C18	Not assigned			
C19	Not assigned			
C20	Not assigned			
C21	Elect,(CE04C1J4R7)	4.7μF,±20%,63V		
C22	Cer,(CK924C1H * M)	0.001 to 0.01μF,±20%, 50V		Q'ty 0 to 2, *
C23	Cer,(CK924C1H * M)	0.001 to 0.1μF,±20%, 50V		Q'ty 0 to 2, *
C24	Elect,(CE04C1J2R2)	2.2μF,±20%,63V		
C25	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		Q'ty 0 to 3
C26	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C27	Elect,(ECEA1AG102S)	1000μF,+50/-20%,10V		
C28	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C29	Elect,(CE04C1A470)	47μF,±20%,10V		
C30	Elect,(CE04C1J2R2)	2.2μF,±20%,63V		
C31	Not assigned			
C32	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C33	Not assigned			
C34	Not assigned			
C35	Cer,(CC924CH1H221J)	220pF,±5%,50V		
C36	Plast,(ECQ-P1 * FZ)	0.001 to 0.0168μF, ±1%,100V		Q'ty 0 or 1, *
C37 to C50	Not assigned			
C51	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C52	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C53	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C54	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		

( ): Manufacturer's part number

* : Selected at factory

Table 4-2 COMPONENT LIST FOR POWER SUPPLY CIRCUIT
(422U10935 P.C. BOARD), (Transmitter Z2 Circuit Diagram 4)

CKT REF	DESCRIPTION	RATING		NOTE
C55	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C56	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C57	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C58	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C59	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C60	Not assigned			
C61	Cer,(CK924C1H * M)	0.001 to 0.1µF,±20%, 50V		Q'ty 0 to 2, *
C62	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C63	Elect,(CE04C1J2R2)	2.2µF,±20%,63V		
C64	Elect,(CE04C1J2R2)	2.2µF,±20%,63V		
C65	Elect,(CE04C1J4R7)	4.7µF,±20%,63V		
C66	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C67	Elect,(CE04C1J4R7)	4.7µF,±20%,63V		
C68	Plast,(ECQ-P1 123FZ)	0.012µF,±1%,100V		
C69	Elect,(CE04C1E220)	22µF,±20%,25V		
C70	Cer,(RPE111CH * G50)	100 to 680pF,±2%,50V		*
C71	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C72	Cer,(CC924C1H103M)	0.01µF,±20%,50V		
C73	Cer,(CC924C1H104M)	0.1µF,±20%,50V		
F 1	Fuse,(MF51NN240V5ADC01)	5A		
F 2	Fuse,(MF51NN250V5ADC01)	5A		
F 3	Fuse,(MF51NN250V1ADC01)	1A		
F 4	Fuse,(MF51NN250V1ADC01)	1A		
F 5	Fuse,(MF51NN250V1.6A DC01)	1.6A		
F 6	Fuse,(SF-96U)	96°C,10A,250V		
J 1	Connector,(DF1-10P-2.5DSA)			
J 2	Connector,(HIF3-26P-2.54DSA)			
J 3	Connector,(HIF3-40P-2.54DSA)			
J 4	Connector,(HIF3-34P-2.54DSA)			
K 1	Relay,(G2L-113P-V)			
L 1	Coil,(SKL-202A)	50µH		
L 2	Coil,(SC-10-100)	1mH		
L 3	Coil,(HP-023)	300µH		
L 4	Coil,(HP-023)	300µH		
L 5	Coil,(LH1-471K)	470µH		

( ): Manufacturer's part number

* : Selected at factory

Table 4-2 COMPONENT LIST FOR POWER SUPPLY CIRCUIT (422U10935 P.C. BOARD), (Transmitter Z2 Circuit Diagram 4)

CKT REF	DESCRIPTION	RATING		NOTE
L 6	Coil,(SKL-103A)	100μH		
M 1	Timer,(TM-0)	5000H		
Q 1	IC,(μPC451C)			
Q 2	Di,breakdown,(02BZ2.2)	1.88 to 2.56V,250mW		
Q 3	Rectifier,(D5FB20)			
Q 4	Not assigned			
Q 5	IC,(μPC14312H)			
Q 6	IC,(μPC16312H)			
Q 7	Di, breakdown,(RD5.1E)	4.8 to 5.37V,400mW		
Q 8	Not assigned			
Q 9	Not assigned			
Q10	Di,(S10SC4M)			
Q11	Not assigned			
Q12	Tr,(2SC1008)			
Q13	Di,(VO3G)			
Q14	Photo coupler,(PC618)			
Q15	Di,breakdown,(RD13E)	12.11 to 13.66V, 400mW		
Q16	Not assigned			
Q17	Di,(1S955)			
Q18	Di,(1S955)			
Q19	Tr,(2SA780A)			
Q20	Tr,(2SA780A)			
Q21	IC,(μPC1042C)			
Q22	Di,(1S953)			
Q23	Not assigned			
Q24	Di,(1S955)			
Q25	Di,(1S955)			
Q26	Di,(VO3G)			
Q27	Di,(1S955)			
Q28	Di,(1S955)			
Q29	Di,(VO3G)			
Q30	Tr,(2SC3164)			
Q31	Tr,(2SC3164)			
Q32	Di,(S5KC20H)			
Q33	Di,(S10SC4MR)			
Q34	Di,(S5KC20HR)			
Q35	Di,(S5KC20H)			
Q36	Di,(1S1300)			
Q37 to Q48	Not assigned			
Q49	IC,(μPD8255AC-2)			B

( ): Manufacturer's part number

* : Selected at factory

Table 4-2 COMPONENT LIST FOR POWER SUPPLY CIRCUIT
(422U10935 P.C. BOARD), (Transmitter Z2 Circuit Diagram 4)

CKT REF	DESCRIPTION	RATING		NOTE
Q50	IC,(HM6116LP-3)			
Q51	IC,(74LS365A)			
Q52	IC,(74LS245)			
Q53	IC,(μPD8279C-2)			
Q54	Not assigned			
Q55	IC,(74LS14)			
Q56	IC,(74LS365A)			
Q57	IC,(μPD8253C-2)			
Q58	IC,(74LS04)			
Q59	IC,(HN482764G-4)			
Q60	IC,(74LS42)			
Q61	IC,(74LS365A)			
Q62	IC,(74LS32)			
Q63	IC,(TC40H004P)			
Q64	IC,(74LS74A)			
Q65	IC,(7437)			
Q66	IC,(μPD780C)			
Q67	Not assigned			
Q68	IC,(74LS00)			
Q69	IC,(TL7705CP)			
Q70	IC,(74LS27)			
Q71	IC,(74LS74A)			
Q72	IC,(1S953)			
Q73	Rectifier,(RB-152-LFB)			
Q74	Photo coupler,(PC614)			
Q75	IC,(TC4011BP)			
Q76	Di,(1SS99)			
Q77	IC,(8038ACJD)			
Q78	Tr,(2SC2718)			
Q79	IC,(74LS123)			
Q80	Tr,(2SC2718)			
R 1	Not assigned			
R 2	Not assigned			
R 3	CF,(ARD25T560J)	56Ω,±5%,1/4W		
R 4	Not assigned			
R 5	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R 6	CF,(ARD25T * J)	4.7k to 100kΩ,±5%, 1/4W		Q'ty 1 to 3, *
R 7	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R 8	CF,(ARD25T * J)	10kΩ to 1MΩ,±5%,1/4W		Q'ty 1 to 3, *
R 9	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R10	MF,(RS1FB 4.7kΩJ)	4.7kΩ,±5%,1W		
R11	CF,(ARD25T151J)	150Ω,±5%,1/4W		

( ): Manufacturer's part number

* : Selected at factory

Table 4-2 COMPONENT LIST FOR POWER SUPPLY CIRCUIT (422U10935 P.C. BOARD), (Transmitter Z2 Circuit Diagram 4)

CKT REF	DESCRIPTION	RATING		NOTE
R12	MF,(RN14K2H332J)	3.3kΩ,±5%,1/2W		
R13	Var,MF,(RJ-6P 1kΩ)	1kΩ,1/2W		
R14	CF,(ERF-5SK-3R3)	3.3Ω,±10%,5W		
R15	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R16	Not assigned			
R17	Not assigned			
R18	Not assigned			
R19	Not assigned			
R20	Not assigned			
R21	Not assigned			
R22	CF,(ARD25T * J)	1k to 100kΩ,±5%,1/4W		Q'ty 1 to 3, *
R23	CF,(ARD25T473J)	47kΩ,±5%,1/4W		
R24	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R25	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R26	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R27	CF,(ARD25T * J)	22k to 100kΩ,±5%, 1/4W		Q'ty 1 to 3, *
R28	Not assigned			
R29	Not assigned			
R30	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R31	CF,(ARD25T473J)	47kΩ,±5%,1/4W		
R32	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R33	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R34	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R35	CF,(ARD25T * J)	6.8 to 22Ω,±5%,1/4W		Q'ty 0 to 2, *
R36	CF,(ARD25T * J)	10 to 100Ω,±5%,1/4W		Q'ty 1 or 2, *
R37	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R38	CF,(ARD25T * J)	6.8 to 22Ω,±5%,1/4W		Q'ty 0 to 2, *
R39	CF,(ARD25T * J)	10 to 100Ω,±5%,1/4W		Q'ty 1 or 2, *
R40	Not assigned			
R41	Not assigned			
R42	Not assigned			
R43	CF,(ARD25T * J)	10k to 100kΩ,±5%, 1/4W		Q'ty 0 or 1, *
R44	Not assigned			
R45	Not assigned			
R46	Not assigned			
R47	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R48	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R49	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R50	Not assigned			B

( ): Manufacturer's part number

* : Selected at factory

Table 4-2 COMPONENT LIST FOR POWER SUPPLY CIRCUIT
(422U10935 P.C. BOARD), (Transmitter Z2 Circuit Diagram 4)

CKT REF	DESCRIPTION	RATING		NOTE
R51	Single in-line array, (IHR-8-103JA)	10kΩ x 8,1/8W		
R52	Not assigned			
R53	Single in-line array, (IHR-8-103JA)	10kΩ x 8,1/8W		
R54	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R55	Not assigned			
R56	Not assigned			
R57	CF,(ARD25T121J)	120Ω,±5%,1/4W		
R58	MF,(RN14K2H332J)	3.3kΩ,±5%,1/2W		
R59	Not assigned			
R60	MF,(RS1FB 47ΩJ)	47Ω,±5%,1W		
R61	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R62	MF,(RS1FB 3.3kΩJ)	3.3kΩ,±5%,1/4W		
R63	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R64	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R65	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R66	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R67	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R68	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R69	CF,(ARD25T823J)	82kΩ,±5%,1/4W		
R70	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R71	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R72	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R73	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R74	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R75	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R76	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R77	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R78	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R79	CF,(ARD25T103J)	10k ,±5%,1/4W		
S 1	Switch,(DIP-A(4))			
T 1	Trans,(44T75381)			
T 2	Trans,(44T75381)			
T 3	Trans,(44T76857)			
X 1	CSA4.00MT	4MHz		
Z 1	CSC300	30pF x 2		
Z 2	Battery,(GB150-3)	150mAh		

B

( ): Manufacturer's part number

* : Selected at factory

Table 4-3 COMPONENT LIST FOR PATTERN GENERATOR CIRCUIT (422U10937 P.C. BOARD), (Transmitter Z3 Circuit Diagram 5)

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Elect,(CE04C1C330)	33µF,±20%,16V		
C 2	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C 3	Elect,(CE04C1A470)	47µF,±20%,10V		
C 4	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C 5	Elect,(CE04C1A470)	47µF,±20%,10V		
C 6	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C 7	Elect,(CE04C1C330)	33µF,±20%,16V		
C 8	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C 9	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C10	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C11	Cer,(CC924CH1H470J)	47pF,±5%,50V		
C12	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C13	Elect,(CE04C1C330)	33µF,±20%,16V		
C14	Not assigned			
C15	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C16	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C17	Not assigned			
C18	Not assigned			
C19	Not assigned			
C20	Not assigned			
C21	Not assigned			
C22	Not assigned			
C23	Not assigned			
C24	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C25	Not assigned			
C26	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C27	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C28	Cer,(CC924CH1H101J)	100pF,±5%,50V		
C29	Cer,(RD340CK * CY50)	0.5 to 1pF,±0.25pF, 50V		Q'ty 1 to 3, *
	Cer,(CC924CK1H020C)	2pF,±0.25pF,50V		
	Cer,(CC924CJ1H030C)	3pF,±0.25pF,50V		
	Cer,(CC924CH1H * D)	4 to 10pF,±0.5pF, 50V		
C30	Cer,(CK924C1H104M)	0.1µF,±20%,50V		
C31	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C32	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C33	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C34	Not assigned			
C35	Not assigned			
C36	Cer,(RD340CK * CY50)	0.5 to 1pF,±0.25pF, 50V		Q'ty 1 to 3, *
	Cer,(CC924CK1H020C)	2pF,±0.25pF,50V		
	Cer,(CC924CJ1H030C)	3pF,±0.25pF,50V		
	Cer,(CC924CH1H * D)	4 to 10pF,±0.5pF, 50V		
C37	Cer,(CC924CH1H470J)	47pF,±5%,50V		
C38	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		C

( ): Manufacturer's part number

* : Selected at factory

Table 4-3 COMPONENT LIST FOR PATTERN GENERATOR CIRCUIT (422U10937 P.C. BOARD), (Transmitter Z3 Circuit Diagram 5)

CKT REF	DESCRIPTION	RATING		NOTE
C39	Not assigned			
C40	Cer,(CC924CH1H * D)	4 to 10pF,±0.5pF,50V		Q'ty 0 to 3, *
	Cer,(CC924CH1H * J)	12 to 47pF,±5%,50V		
C41	Cer,(CC924CH1H101J)	100pF,±5%,50V		
C42	Cer,(CC924CH1H101J)	100pF,±5%,50V		
C43	Cer,(CC924CH1H151J)	150pF,±5%,50V		
C44	Cer,(CC924CH1H151J)	150pF,±5%,50V		
C45	Not assigned			
C46	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C47	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C48	Not assigned			
C49	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C50	Cer,(CC924CH1H510J)	51pF,±5%,50V		
C51	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C52	Cer,(RD340CK010CY50)	1pF,±0.25pF,50V		
C53	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C54	Cer,(CC924CH1H101J)	100pF,±5%,50V		
C55	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C56	Not assigned			
C57	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C58	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C59	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C60	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C61	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C62	Not assigned			
C63	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C64	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C65	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C66	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C67	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C68	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C69	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C70	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C71	Not assigned			
C72	Not assigned			
C73	Not assigned			
C74	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C75	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C76	Not assigned			
C77	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C78	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C79	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C80	Not assigned			
C81	Not assinged			
C82	Not assigned			
C83 to C108	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		

( ): Manufacturer's part number

* : Selected at factory

Table 4-3 COMPONENT LIST FOR PATTERN GENERATOR CIRCUIT (422U10937 P.C. BOARD), (Transmitter Z3 Circuit Diagram 5)

CKT REF	DESCRIPTION	RATING		NOTE
C109	Not assigned			
C110 to C120	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C121	Not assigned			
C122	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C123	Not assigned			
C124	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C125	Not assigned			
C126	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C127	Not assigned			
C128	Not assigned			
C129	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C130	Not assigned			
C131	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C132	Not assigned			
C133	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C134	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C135	Not assigned			
C136	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C137	Not assigned			
C138	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C139	Not assigned			
C140	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C141	Cer,(RPE111CH161G50)	160pF,±2%,50V		
C142	Not assigned			
C143	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C144	Cer,(RPE111CH161G50)	160pF,±2%,50V		
C145	Not assigned			
C146	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C147	Cer,(RPE111CH161G50)	160pF,±2%,50V		
C148	Not assigned			
C149	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C150	Cer,(RPE111CH161G50)	160pF,±2%,50V		
C151	Not assigned			
C152	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C153	Cer,(RPE111CH161G50)	160pF,±2%,50V		
C154	Not assigned			
C155	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C156	Cer,(RPE111CH161G50)	160pF,±2%,50V		
C157	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C158	Not assigned			
C159	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C160	Not assigned			
C161	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		

C

( ): Manufacturer's part number

* : Selected at factory

Table 4-3 COMPONENT LIST FOR PATTERN GENERATOR CIRCUIT (422U10937 P.C. BOARD), (Transmitter Z3 Circuit Diagram 5)

CKT REF	DESCRIPTION	RATING		NOTE
C162	Not assigned			
C163	Cer,(RD340CK * CY50)	0.5 to 1pF,±0.25pF, 50V		
	Cer,(CC924CK1H020C)	2pF,±0.25pF,50V		Q'ty 0 to 3, *
	Cer,(CC924CJ1H030C)	3pF,±0.25pF,50V		
	Cer,(CC924CH1H * D)	4 to 10pF,±0.5pF,50V		
	Cer,(CC924CH1H * J)	12 to 100pF,±5%,50V		
C164	Cer,(RD340CK * CY50)	0.5 to 1pF,±0.25pF, 50V		
	Cer,(CC924CK1H020C)	2pF,±0.25pF,50V		Q'ty 0 to 3, *
	Cer,(CC924CJ1H030C)	3pF,±0.25pF,50V		
	Cer,(CC924CH1H * D)	4 to 10pF,±0.5pF,50V		
	Cer,(CC924CH1H * J)	12 to 100pF,±5%,50V		
C165	Cer,(RD340CK * CY50)	0.5 to 1pF,±0.25pF, 50V		
	Cer,(CC924CK1H020C)	2pF,±0.25pF,50V		Q'ty 0 to 3, *
	Cer,(CC924CJ1H030C)	3pF,±0.25pF,50V		
	Cer,(CC924CH1H * D)	4 to 10pF,±0.5pF,50V		
	Cer,(CC924CH1H * J)	12 to 100pF,±5%,50V		
C166	Cer,(RD340CK * CY50)	0.5 to 1pF,±0.25pF, 50V		
	Cer,(CC924CK1H020C)	2pF,±0.25pF,50V		Q'ty 0 to 3, *
	Cer,(CC924CJ1H030C)	3pF,±0.25pF,50V		
	Cer,(CC924CH1H * D)	4 to 10pF,±0.5pF,50V		
	Cer,(CC924CH1H * J)	12 to 100pF,±5%,50V		
C167	Cer,(RD340CK * CY50)	0.5 to 1pF,±0.25pF, 50V		
	Cer,(CC924CK1H020C)	2pF,±0.25pF,50V		Q'ty 0 to 3, *
	Cer,(CC924CJ1H030C)	3pF,±0.25pF,50V		
	Cer,(CC924CH1H * D)	4 to 10pF,±0.5pF,50V		
	Cer,(CC924CH1H * J)	12 to 100pF,±5%,50V		
C168	Cer,(RD340CK * CY50)	0.5 to 1pF,±0.25pF, 50V		
	Cer,(CC924CK1H020C)	2pF,±0.25pF,50V		Q'ty 0 to 3, *
	Cer,(CC924CJ1H030C)	3pF,±0.25pF,50V		
	Cer,(CC924CH1H * D)	4 to 10pF,±0.5pF,50V		
	Cer,(CC924CH1H * J)	12 to 100pF,±5%,50V		
C169	Cer,(CC924CH1H510J)	51pF,±5%,50V		
C170	Cer,(CC924CK1H020C)	2pF,±0.25pF,50V		
C171	Cer,(CC924CH1H510J)	51pF,±5%,50V		
C172	Cer,(CC924CK1H020C)	2pF,±0.25pF,50V		
C173	Cer,(CC924CH1H510J)	51pF,±5%,50V		
C174	Cer,(CC924CK1H020C)	2pF,±0.25pF,50V		
C175	Cer,(CC924CH1H510J)	51pF,±5%,50V		
C176	Cer,(CC924CK1H020C)	2pF,±0.25pF,50V		
C177	Cer,(CC924CH1H510J)	51pF,±5%,50V		
C178	Cer,(CC924CK1H020C)	2pF,±0.25pF,50V		

( ): Manufacturer's part number

* : Selected at factory

Table 4-3 COMPONENT LIST FOR PATTERN GENERATOR CIRCUIT (422U10937 P.C. BOARD), (Transmitter Z3 Circuit Diagram 5)

CKT REF	DESCRIPTION	RATING		NOTE
C179	Cer,(CC924CH1H510J)	51pF,5%,50V		
C180	Cer,(CC924CK1H020C)	2pF,±0.25pF,50V		
C181	Cer,(CC924F1H104Z)	0.1μF,+80/-20%,50V		
C182	Not assigned			
C183	Not assigned			
C184	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C185	Not assigned			
C186	Not assigned			
C187	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C188	Not assigned			
C189	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C190	Not assigned			
C191	Not assigned			
C192	Not assigned			
C193	Not assigned			
C194	Not assigned			
C195	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C196	Not assigned			
C197	Not assigned			
C198	Not assigned			
C199	Not assigned			
C200	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C201	Not assigned			
C202	Not assigned			
C203	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C204	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C205	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C206	Not assigned			
C207	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C208	Not assigned			
C209	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C210	Not assigned			
C211	Elect,(CE04C1J2R2)	2.2μF,±20%,63V		
C212	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C213	Cer,(CC924CH1H471J)	470pF,±5%,50V		
C214	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C215	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C216	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C217	Not assigned			
C218	Not assigned			
C219	Not assigned			
C220	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C221	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C222	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C223	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C224	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C225	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		

( ): Manufacturer's part number

* : Selected at factory

Table 4-3 COMPONENT LIST FOR PATTERN GENERATOR CIRCUIT (422U10937 P.C. BOARD), (Transmitter Z3 Circuit Diagram 5)

CKT REF	DESCRIPTION	RATING		NOTE
C226	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C227	Not assigned			
C228	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C229	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C230	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C231	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C232	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C233	Not assigned			
C234	Cer,(CC924CH1H * J)	12 to 22pF,±5%,50V		Q'ty 0 or 1, *
C235	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C236	Elect,(CE04C1C330)	33μF,±20%,16V		
C237	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C238	Not assigned			
C239	Not assigned			
C240	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C241	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C242	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C243	Cer,(CC924CH1H * D)	3 to 10pF,±0.5pF,50V		Q'ty 0 to 3, *
	Cer,(CC924CH1H * J)	12 to 47pF,±5%,50V		
C244	Cer,(CC924CH1H * D)	4 to 10pF,±0.5pF,50V		Q'ty 0 to 3, *
	Cer,(CC924CH1H * J)	12 to 47pF,±5%,50V		
C245	Cer,(CC924CH1H * D)	4 to 10pF,±0.5pF,50V		Q'ty 0 to 3, *
	Cer,(CC924CH1H * J)	12 to 47pF,±5%,50V		
C246	Cer,(CC924CH1H * D)	4 to 10pF,±0.5pF,50V		Q'ty 0 to 3, *
	Cer,(CC924CH1H * J)	12 to 47pF,±5%,50V		
C247	Cer,(CC924CH1H * D)	4 to 10pF,±0.5pF,50V		Q'ty 0 to 3, *
	Cer,(CC924CH1H * J)	12 to 47pF,±5%,50V		
C248	Cer,(CC924CH1H * D)	4 to 10pF,±0.5pF,50V		Q'ty 0 to 3, *
	Cer,(CC924CH1H * J)	12 to 47pF,±5%,50V		
C249	Not assigned			
C250	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C251	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C252	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C253	Not assigned			
C254	Not assigned			
C255	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C256	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C257	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C258	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C259	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C260	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C261	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C262	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C263	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C264	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C265	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C266	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C267	Cer,(CC924CH1H*D)	4p to 10pF,±0.5pF,50V		Q'ty 0 to 3, *
	Cer,(CC924CH1H*J)	12p to 22pF,±5%,50V		

( ): Manufacturer's part number

* : Selected at factory

Table 4-3 COMPONENT LIST FOR PATTERN GENERATOR CIRCUIT (422U10937 P.C. BOARD), (Transmitter Z3 Circuit Diagram 5)

CKT REF	DESCRIPTION	RATING		NOTE
C268	Cer,(CC924CH1H*D)	4p to 10pF,±0.5pF,50V		Q'ty 0 to 3, *
	Cer,(CC924CH1H*J)	12p to 22pF,±5%,50V		
C269	Cer,(CC924CH1H*D)	4p to 10pF,±0.5pF,50V		Q'ty 0 to 3, *
	Cer,(CC924CH1H*J)	12p to 22pF,±5%,50V		
C270	Cer,(CC924CH1H*D)	4p to 10pF,±0.5pF,50V		Q'ty 0 to 3, *
	Cer,(CC924CH1H*J)	12p to 22pF,±5%,50V		
C271	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C272	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C273	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C274	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
J 1	Receptacle,(BNC-R-NI)			
J 2	Receptacle,(BNC-R-NI)			
J 3	Receptacle,(BNC-R-NI)			
J 4	Receptacle,(BNC-R-NI)			
J 5	Receptacle,(BNC-R-NI)			
J 6	Receptacle,(BNC-R-NI)			
J 7	Receptacle,(BNC-R-NI)			
J 8	Receptacle,(BNC-R-NI)			
J 9	Receptacle,(BNC-R-NI)			
J10	Jack,(J12-2)			
J11	Jack,(J12-2)			
J12	Jack,(J12-2)			
J13	Jack,(J12-2)			
J14	Jack,(J12-2)			
J15	Jack,(J12-2)			
J16	Connector,(HIF23A-40D-AA30S)			
J17	Connector,(U-SB1501)			
J18	Not assigned			
J19	Connector,(DF1-15P-2.5DSA)			
J20	Not assigned			
J21 to J27	Connector,(DIC-149-3P)			
J28 to J34	Not assigned			
J35	Connector,(DIC-149-3P)			
J36 to J43	Connector,(DIC-128)			
J44 to J50	Not assigned			
J51	Connector,(DIC-149-3P)			
J52	Connector,(DIC-128)			

( ): Manufacturer's part number

* : Selected at factory

Table 4-3 COMPONENT LIST FOR PATTERN GENERATOR CIRCUIT (422U10937 P.C. BOARD), (Transmitter Z3 Circuit Diagram 5)

CKT REF	DESCRIPTION	RATING		NOTE
K 1	Relay,(PG1A-05)			
K 2	Relay,(PG1A-05)			
K 3 to K14	Relay,(PRB-4)			
K15	Relay,(PG1A-05)			
K16	Relay,(PG1A-05)			
K17	Relay,(PG1A-05)			
K18	Relay,(PG1A-05)			
K19	Relay,(PG1A-05)			
K20	Relay,(PG1A-05)			
K21	Relay,(PG1C-05)			
L 1	Coil,(10K17-75T)	0.282μH		
L 2	Coil,(LF8-560K)	56μH		
L 3	Coil,(LF8-121K)	120μH		
L 4	Coil,(LF8-121K)	120μH		
L 5	Coil,(LF8-560K)	56μH		
L 6	Coil,(LF8-121K)	120μH		
L 7	Coil,(LF8-121K)	120μH		
L 8	Coil,(SP0408-1R5K)	1.5μH		
L 9	Coil,(10K17-85T)	0.358μH		
L10	Coil,(439T23535)	0.89μH		
L11	Coil,(439T23535)	0.89μH		
L12	Coil,(439T23535)	0.89μH		
L13	Coil,(439T23535)	0.89μH		
L14	Coil,(439T23535)	0.89μH		
L15	Coil,(439T23535)	0.89μH		
L16	Coil,(442T77577)	0.3μH		
L17	Coil,(442T77577)	0.3μH		
L18	Coil,(442T77577)	0.3μH		
L19	Coil,(442T77577)	0.3μH		
L20	Coil,(442T77577)	0.3μH		
L21	Coil,(442T77577)	0.3μH		
Q 1	IC,(HD10125)			
Q 2	IC,(74S04)			
Q 3	IC,(74S64)			
Q 4	IC,(74S00)			
Q 5	IC,(74S74)			
Q 6	IC,(74S74)			
Q 7	IC,(74S00)			
Q 8	IC,(74S10)			
Q 9	IC,(74S04)			
Q10	IC,(74F374)			
Q11	IC,(74F374)			
Q12	IC,(74S02)			

( ): Manufacturer's part number

* : Selected at factory

Table 4-3 COMPONENT LIST FOR PATTERN GENERATOR CIRCUIT (422U10937 P.C. BOARD), (Transmitter Z3 Circuit Diagram 5)

CKT REF	DESCRIPTION	RATING		NOTE
Q13	IC,(74F86)			
Q14	IC,(74F86)			
Q15	IC,(74F86)			
Q16	IC,(74S64)			
Q17	IC,(74LS04)			
Q18	IC,(74F161)			
Q19	IC,(74F74)			
Q20	IC,(74F08)			
Q21	IC,(74F08)			
Q22	IC,(74F374)			
Q23	IC,(74S112)			
Q24	IC,(74S112)			
Q25	IC,(74S112)			
Q26	IC,(74S174)			
Q27	IC,(74S08)			
Q28	IC,(74LS161)			
Q29	IC,(74LS132)			
Q30	IC,(74LS74)			
Q31	IC,(74LS00)			
Q32	IC,(74LS08)			
Q33	IC,(74LS04)			
Q34	IC,(74LS08)			
Q35	IC,(74LS74A)			
Q36	IC,(74LS54)			
Q37	IC,(74LS00)			
Q38	IC,(74F190)			
Q39	IC,(74LS08)			
Q40	IC,(74S02)			
Q41	IC,(74S02)			
Q42	IC,(74S02)			
Q43	IC,(74F86)			
Q44	IC,(74F86)			
Q45	IC,(74S10)			
Q46	IC,(74LS38)			
Q47	IC,(74S10)			
Q48	IC,(74F175)			
Q49	IC,(74S74)			
Q50	IC,(74S112)			
Q51	IC,(74S74)			
Q52	IC,(74S00)			
Q53	IC,(74S04)			
Q54	IC,(74S04)			
Q55	IC,(HD10124)			
Q56	Not assigned			
Q57	IC,(74S374)			
Q58	IC,(74S374)			
Q59	IC,(74S374)			
Q60	IC,(74S374)			

( ): Manufacturer's part number

* : Selected at factory

Table 4-3 COMPONENT LIST FOR PATTERN GENERATOR CIRCUIT (422U10937 P.C. BOARD), (Transmitter Z3 Circuit Diagram 5)

CKT REF	DESCRIPTION	RATING		NOTE
Q61	IC,(HD10124)			
Q62	IC,(HD10124)			
Q63	IC,(HD10124)			
Q64	IC,(HD10124)			
Q65	IC,(HD10101)			
Q66	IC,(HD10101)			
Q67	IC,(HD10101)			
Q68	IC,(TD62003P)			
Q69	IC,(HD10124)			
Q70	IC,(HD10124)			
Q71	Not assigned			
Q72	IC,(MC10176)			
Q73	IC,(74F161)			
Q74	IC,(74F74)			
Q75	IC,(74LS74)			
Q76	IC,(74F74)			
Q77	IC,(74LS74A)			
Q78	IC,(74LS86)			
Q79	IC,(74LS191)			
Q80	IC,(74LS191)			
Q81	IC,(74LS191)			
Q82	IC,(HA17012PC)			
Q83	IC,(74LS123)			
Q84	IC,(μPC151C)			
Q85	IC,(μPC271C)			
Q86	IC,(74LS20)			
Q87	IC,(TC40H000P)			
Q88	IC,(74LS08)			
Q89	IC,(74S00)			
Q90	IC,(HA3-2525-5)			
Q91	IC,(HA3-2525-5)			
Q92	IC,(HA3-2525-5)			
Q93	IC,(MC1648)			
Q94	IC,(μPC16305)			
Q95	IC,(74LS00)			
Q96	IC,(F10016)			
Q97	IC,(MC10H102)			
Q98	IC,(MC12040L)			
Q99	IC,(HD10124)			
Q100	IC,(74LS161A)			
Q101	Tr,(2SC1907)			
Q102	Tr,(2SC1907)			
Q103	Tr,(2SC1907)			
Q104	Tr,(2SC1907)			
Q105	Tr,(2SC2718)			
Q106	Tr,(2SC1907)			
Q107	Tr,(2SC1907)			
Q108	Di,varicap,(FC52M)			

( ): Manufacturer's part number

* : Selected at factory

Table 4-3 COMPONENT LIST FOR PATTERN GENERATOR CIRCUIT (422U10937 P.C. BOARD), (Transmitter Z3 Circuit Diagram 5)

CKT REF	DESCRIPTION	RATING		NOTE
Q109	Di,varicap,(FC52M)			
Q110	Di,breakdown,(1SZ52)	5.9 to 6.5V,250mW		
Q111	Di,(1S953)			
Q112	Di,breakdown,(RD2.0E)	1.88 to 2.24V,400mW		
Q113	Di,(1S953)			
Q114	Di,breakdown,(RD6.2E)	5.78 to 6.44V,400mW		
Q115	Not assigned			
Q116	Di,(1S953)			
Q117	IC,(74LS02)			
Q118	IC,(TD62003P)			
Q119 to Q142	Tr,(2SC1907)			
Q143 to Q166	Di,breakdown,(RD3.6E)	3.4 to 3.845V,400mW		
Q167 to Q190	Tr,(2SC1907)			
Q191 to Q204	Di,breakdown,(RD2.7E)	2.5 to 2.93V,400mW		
Q205	Tr,(2SC2498)			
Q206	Tr,(2SC2498)			
Q207	Tr,(2SA1161)			
Q208	Tr,(2SC2498)			
Q209	Tr,(2SC2498)			
Q210	Tr,(2SA1161)			
Q211	Tr,(2SC2498)			
Q212	Tr,(2SC2498)			
Q213	Tr,(2SA1161)			
Q214	Tr,(2SC2498)			
Q215	Tr,(2SC2498)			
Q216	Tr,(2SA1161)			
Q217	Tr,(2SC2498)			
Q218	Tr,(2SC2498)			
Q219	Tr,(2SA1161)			
Q220	Tr,(2SC2498)			
Q221	Tr,(2SC2498)			
Q222	Tr,(2SA1161)			
Q223	Tr,(2SC2498)			
Q224	Tr,(2SC2498)			
Q225	Tr,(2SA1161)			
Q226	Not assigned			
Q227	Not assigned			
Q228	Not assigned			
Q229	Not assigned			
Q230	Not assigned			
Q231	Not assigned			

( ): Manufacturer's part number

* : Selected at factory

Table 4-3 COMPONENT LIST FOR PATTERN GENERATOR CIRCUIT (422U10937 P.C. BOARD), (Transmitter Z3 Circuit Diagram 5)

CKT REF	DESCRIPTION	RATING		NOTE
Q232	Not assigned			
Q233	Not assigned			
Q234	Not assigned			
Q235	Tr,(2SC1907)			
Q236	Tr,(2SC1907)			
Q237	Tr,(2SA1154)			
Q238	IC,(74LS74A)			
Q239	IC,(HD10101)			
Q240	IC,(74LS74A)			
Q241	IC,(74F74PC)			
Q242	IC,(74S04)			
Q243	IC,(74S04)			
Q244	Tr,(2SA1154)			
Q245	Tr,(2SC2498)			
R 1	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R 2	CF,(ARD25T562J)	5.6kΩ,±5%,1/4W		
R 3	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R 4	CF,(ARD25T561J)	560Ω,±5%,1/4W		
R 5	CF,(ARD25T561J)	560Ω,±5%,1/4W		
R 6	CF,(ARD25T271J)	270Ω,±5%,1/4W		
R 7	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R 8	Not assigned			
R 9	Not assigned			
R10	CF,(ARD25T123J)	12kΩ,±5%,1/4W		
R11	Single in-line array, (IHR-4-332JA)	3.3kΩ x 4,1/8W		
R12	CF,(ARD25T473J)	47kΩ,±5%,1/4W		
R13	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R14	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R15	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R16	CF,(ARD25T272J)	2.7kΩ,±5%,1/4W		
R17	CF,(ARD25T272J)	2.7kΩ,±5%,1/4W		
R18	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R19	Var,MF,(RJ-6P 1kΩ)	1kΩ,1/2W		
R20	Not assigned			
R21	CF,(ARD25T330J)	33Ω,±5%,1/4W		
R22	Not assigned			
R23	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R24	Not assigned			
R25	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R26	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R27	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R28	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R29	CF,(ARD25T511J)	510Ω,±5%,1/4W		
R30	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R31	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R32	CF,(ARD25T122J)	1.2kΩ,±5%,1/4W		

( ): Manufacturer's part number

* : Selected at factory

Table 4-3 COMPONENT LIST FOR PATTERN GENERATOR CIRCUIT (422U10937 P.C. BOARD), (Transmitter Z3 Circuit Diagram 5)

CKT REF	DESCRIPTION	RATING		NOTE
R33	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R34	Not assigned			
R35	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R36	Not assigned			
R37	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R38	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R39	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R40	Not assigned			
R41	CF,(ARD25T511J)	510Ω,±5%,1/4W		
R42	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R43	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R44	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R45	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R46	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R47	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R48	Not assigned			
R49	Not assigned			
R50	Single in-line array, (IHR-8-681JA)	680Ω x 8,1/8W		
R51	Var,MF,(RJ-6P 2kΩ)	2kΩ,1/2W		
R52	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R53	Not assigned			
R54	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R55	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R56	CF,(ARD25T * J)	1k to 100kΩ,±5%, 1/4W		Q'ty 1 to 3, *
R57	CF,(ARD25T473J)	47kΩ,±5%,1/4W		
R58	CF,(ARD25T473J)	47kΩ,±5%,1/4W		
R59	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R60	Var,MF,(RJ-6P 20kΩ)	20kΩ,1/2W		
R61	MF,(RN14K2E4320D)	432Ω,±0.5%,1/4W		
R62	MF,(RN14K2E1500D)	150Ω,±0.5%,1/4W		
R63	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R64	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R65	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R66	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R67	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R68	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R69	Var,MF,(RJ-6P 5kΩ)	5kΩ,1/2W		
R70	Not assigned			
R71	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R72	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R73	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R74	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R75	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R76	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R77	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R78	CF,(ARD25T681J)	680Ω,±5%,1/4W		

( ): Manufacturer's part number

* : Selected at factory

Table 4-3 COMPONENT LIST FOR PATTERN GENERATOR CIRCUIT (422U10937 P.C. BOARD), (Transmitter Z3 Circuit Diagram 5)

CKT REF	DESCRIPTION	RATING		NOTE
R 79	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R 80	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R 81	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R 82	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R 83	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R 84	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R 85	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R 86	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R 87	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R 88	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R 89	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R 90	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R 91	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R 92	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R 93	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R 94	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R 95	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R 96	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R 97	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R 98	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R 99	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R100	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R101	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R102	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R103	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R104	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R105	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R106	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R107	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R108	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R109	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R110	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R111	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R112	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R113	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R114	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R115	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R116	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R117	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R118	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R119 to R130	Var,MF,(RJ-6P 100Ω)	100Ω,1/2W		
R131	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R132	CF,(ARD25T * J)	100Ω to 2.2kΩ,5%,1/4W		*
R133	CF,(ARD25T301J)	300Ω,±5%,1/4W		
R134	CF,(ARD25T * J)	100Ω to 2.2kΩ,±5%,1/4W		*
R135	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		

( ): Manufacturer's part number

* : Selected at factory

Table 4-3 COMPONENT LIST FOR PATTERN GENERATOR CIRCUIT (422U10937 P.C. BOARD), (Transmitter Z3 Circuit Diagram 5)

CKT REF	DESCRIPTION	RATING	NOTE
R136	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W	
R137	CF,(ARD25T * J)	100Ω to 2.2kΩ,±5%,1/4W	*
R138	CF,(ARD25T301J)	300Ω,±5%,1/4W	
R139	CF,(ARD25T * J)	100Ω to 2.2kΩ,±5%,1/4W	*
R140	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W	
R141	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W	
R142	CF,(ARD25T * J)	100Ω to 2.2kΩ,±5%,1/4W	*
R143	CF,(ARD25T301J)	300Ω,±5%,1/4W	
R144	CF,(ARD25T * J)	100Ω to 2.2kΩ,±5%,1/4W	*
R145	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W	
R146	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W	
R147	CF,(ARD25T * J)	100Ω to 2.2kΩ,±5%,1/4W	*
R148	CF,(ARD25T301J)	300Ω,±5%,1/4W	
R149	CF,(ARD25T * J)	100Ω to 2.2kΩ,±5%,1/4W	*
R150	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W	
R151	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W	
R152	CF,(ARD25T * J)	100Ω to 2.2kΩ,±5%,1/4W	*
R153	CF,(ARD25T301J)	300Ω,±5%,1/4W	
R154	CF,(ARD25T * J)	100Ω to 2.2kΩ,±5%,1/4W	*
R155	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W	
R156	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W	
R157	CF,(ARD25T * J)	100Ω to 2.2kΩ,±5%,1/4W	*
R158	CF,(ARD25T301J)	300Ω,±5%,1/4W	
R159	CF,(ARD25T * J)	100Ω to 2.2kΩ,±5%,1/4W	*
R160	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W	
R161	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W	
R162	CF,(ARD25T * J)	100Ω to 2.2kΩ,±5%,1/4W	*
R163	CF,(ARD25T301J)	300Ω,±5%,1/4W	
R164	CF,(ARD25T * J)	100Ω to 2.2kΩ,±5%,1/4W	*
R165	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W	
R166	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W	
R167	CF,(ARD25T * J)	100Ω to 2.2kΩ,±5%,1/4W	*
R168	CF,(ARD25T301J)	300Ω,±5%,1/4W	
R169	CF,(ARD25T * J)	100Ω to 2.2kΩ,±5%,1/4W	*
R170	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W	
R171	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W	
R172	CF,(ARD25T * J)	100Ω to 2.2kΩ,±5%,1/4W	*
R173	CF,(ARD25T301J)	300Ω,±5%,1/4W	
R174	CF,(ARD25T * J)	100Ω to 2.2kΩ,±5%,1/4W	*
R175	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W	
R176	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W	
R177	CF,(ARD25T * J)	100Ω to 2.2kΩ,±5%,1/4W	*
R178	CF,(ARD25T301J)	300Ω,±5%,1/4W	
R179	CF,(ARD25T * J)	100Ω to 2.2kΩ,±5%,1/4W	*
R180	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W	
R181	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W	
R182	CF,(ARD25T * J)	100Ω to 2.2kΩ,±5%,1/4W	*
R183	CF,(ARD25T301J)	300Ω,±5%,1/4W	

( ): Manufacturer's part number

* : Selected at factory

Table 4-3 COMPONENT LIST FOR PATTERN GENERATOR CIRCUIT (422U10937 P.C. BOARD), (Transmitter Z3 Circuit Diagram 5)

CKT REF	DESCRIPTION	RATING	NOTE
R184	CF,(ARD25T * J)	100Ω to 2.2kΩ,±5%,1/4W	*
R185	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W	
R186	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W	
R187	CF,(ARD25T * J)	100Ω to 2.2kΩ,±5%,1/4W	*
R188	CF,(ARD25T301J)	300Ω,±5%,1/4W	
R189	CF,(ARD25T * J)	100Ω to 2.2kΩ,±5%,1/4W	*
R190	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W	
R191	MF,(RN14K2E1130D)	113Ω,±0.5%,1/4W	
R192	MF,(RN14K2E1130D)	113Ω,±0.5%,1/4W	
R193	MF,(RN14K2E1740D)	174Ω,±0.5%,1/4W	
R194	MF,(RN14K2E2740D)	274Ω,±0.5%,1/4W	
R195	MF,(RN14K2E2740D)	274Ω,±0.5%,1/4W	
R196	CF,(ARD25T750J)	75Ω,±5%,1/4W	
R197	CF,(ARD25T750J)	75Ω,±5%,1/4W	
R198	MF,(RN14K2E1130D)	113Ω,±0.5%,1/4W	
R199	MF,(RN14K2E1130D)	113Ω,±0.5%,1/4W	
R200	MF,(RN14K2E1740D)	174Ω,±0.5%,1/4W	
R201	MF,(RN14K2E2740D)	274Ω,±0.5%,1/4W	
R202	MF,(RN14K2E2740D)	274Ω,±0.5%,1/4W	
R203	CF,(ARD25T750J)	75Ω,±5%,1/4W	
R204	CF,(ARD25T750J)	75Ω,±5%,1/4W	
R205	MF,(RN14K2E1130D)	113Ω,±0.5%,1/4W	
R206	MF,(RN14K2E1130D)	113Ω,±0.5%,1/4W	
R207	MF,(RN14K2E1740D)	174Ω,±0.5%,1/4W	
R208	MF,(RN14K2E2740D)	274Ω,±0.5%,1/4W	
R209	MF,(RN14K2E2740D)	274Ω,±0.5%,1/4W	
R210	CF,(ARD25T750J)	75Ω,±5%,1/4W	
R211	CF,(ARD25T750J)	75Ω,±5%,1/4W	
R212	MF,(RN14K2E1130D)	113Ω,±0.5%,1/4W	
R213	MF,(RN14K2E1130D)	113Ω,±0.5%,1/4W	
R214	MF,(RN14K2E1740D)	174Ω,±0.5%,1/4W	
R215	MF,(RN14K2E2740D)	274Ω,±0.5%,1/4W	
R216	MF,(RN14K2E2740D)	274Ω,±0.5%,1/4W	
R217	CF,(ARD25T750J)	75Ω,±5%,1/4W	
R218	CF,(ARD25T750J)	75Ω,±5%,1/4W	
R219	MF,(RN14K2E1130D)	113Ω,±0.5%,1/4W	
R220	MF,(RN14K2E1130D)	113Ω,±0.5%,1/4W	
R221	MF,(RN14K2E1740D)	174Ω,±0.5%,1/4W	
R222	MF,(RN14K2E2740D)	274Ω,±0.5%,1/4W	
R223	MF,(RN14K2E2740D)	274Ω,±0.5%,1/4W	
R224	CF,(ARD25T750J)	75Ω,±5%,1/4W	
R225	CF,(ARD25T750J)	75Ω,±5%,1/4W	
R226	MF,(RN14K2E1130D)	113Ω,±0.5%,1/4W	
R227	MF,(RN14K2E1130D)	113Ω,±0.5%,1/4W	
R228	MF,(RN14K2E1740D)	174Ω,±0.5%,1/4W	
R229	MF,(RN14K2E2740D)	274Ω,±0.5%,1/4W	
R230	MF,(RN14K2E2740D)	274Ω,±0.5%,1/4W	
C R231	CF,(ARD25T750J)	75Ω,±5%,1/4W	

( ): Manufacturer's part number

* : Selected at factory

Table 4-3 COMPONENT LIST FOR PATTERN GENERATOR CIRCUIT (422U10937 P.C. BOARD), (Transmitter Z3 Circuit Diagram 5)

CKT REF	DESCRIPTION	RATING		NOTE
R232	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R233 to R244	MF,(RN14K2E82R5D)	82.5Ω,±0.5%,1/4W		
R245	CF,(ARD25T6R8J)	6.8Ω,±5%,1/4W		
R246	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R247	CF,(ARD25T6R8J)	6.8Ω,±5%,1/4W		
R248	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R249	CF,(ARD25T6R8J)	6.8Ω,±5%,1/4W		
R250	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R251	CF,(ARD25T6R8J)	6.8Ω,±5%,1/4W		
R252	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R253	CF,(ARD25T6R8J)	6.8Ω,±5%,1/4W		
R254	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R255	CF,(ARD25T6R8J)	6.8Ω,±5%,1/4W		
R256	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R257	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R258	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R259	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R260	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R261	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R262	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R263	MF,(RN14K2E8250D)	825Ω,±0.5%,1/4W		
R264	MF,(RN14K2E8250D)	825Ω,±0.5%,1/4W		
R265	MF,(RN14K2E8250D)	825Ω,±0.5%,1/4W		
R266	MF,(RN14K2E8250D)	825Ω,±0.5%,1/4W		
R267	MF,(RN14K2E8250D)	825Ω,±0.5%,1/4W		
R268	MF,(RN14K2E8250D)	825Ω,±0.5%,1/4W		
R269	CF,(ARD25T511J)	510Ω,±5%,1/4W		
R270	Var,MF,(RJ-6P 100Ω)	100Ω,1/2W		
R271	CF,(ARD25T511J)	510Ω,±5%,1/4W		
R272	Var,MF,(RJ-6P 100Ω)	100Ω,1/2W		
R273	CF,(ARD25T511J)	510Ω,±5%,1/4W		
R274	Var,MF,(RJ-6P 100Ω)	100Ω,1/2W		
R275	CF,(ARD25T511J)	510Ω,±5%,1/4W		
R276	Var,MF,(RJ-6P 100Ω)	100Ω,1/2W		
R277	CF,(ARD25T511J)	510Ω,±5%,1/4W		
R278	Var,MF,(RJ-6P 100Ω)	100Ω,1/2W		
R279	CF,(ARD25T511J)	510Ω,±5%,1/4W		
R280	Var,MF,(RJ-6P 100Ω)	100Ω,1/2W		
R281	CF,(ARD25T511J)	510Ω,±5%,1/4W		
R282	Var,MF,(RJ-6P 100Ω)	100Ω,1/2W		
R283	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R284	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R285	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R286	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R287	Var,MF,(RJ-4W 1kΩ)	1kΩ,1/2W		
R288	MF,(RN14K2H151J)	150Ω,±5%,1/2W		

( ): Manufacturer's part number

* : Selected at factory

Table 4-3 COMPONENT LIST FOR PATTERN GENERATOR CIRCUIT (422U10937 P.C. BOARD), (Transmitter Z3 Circuit Diagram 5)

CKT REF	DESCRIPTION	RATING		NOTE
R289	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R290	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R291	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R292	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R293	Var,MF,(RJ-4W 1kΩ)	1kΩ,1/2W		
R294	MF,(RN14K2H151J)	150Ω,±5%,1/4W		
R295	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R296	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R297	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R298	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R299	Var,MF,(RJ-4W 1kΩ)	1kΩ,1/2W		
R300	MF,(RN14K2H151J)	150Ω,±5%,1/4W		
R301	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R302	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R303	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R304	CF,(ARD25T102J)	1Ω,±5%,1/4W		
R305	Var,MF,(RJ-4W 1kΩ)	1kΩ,1/2W		
R306	MF,(RN14K2H151J)	150Ω,±5%,1/2W		
R307	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R308	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R309	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R310	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R311	Var,MF,(RJ-4W 1kΩ)	1kΩ,1/2W		
R312	MF,(RN14K2H151J)	150Ω,±5%,1/2W		
R313	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R314	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R315	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R316	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R317	Var,MF,(RJ-4W 1kΩ)	1kΩ,1/2W		
R318	MF,(RN14K2H151J)	150Ω,±5%,1/2W		
R319	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R320	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R321	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R322	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R323	Var,MF,(RJ-4W 1kΩ)	1kΩ,1/2W		
R324	MF,(RN14K2H151J)	150Ω,±5%,1/2W		
R325	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R326	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R327	MF,(RN14K2H221J)	220Ω,±5%,1/2W		
R328	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R329	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R330	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R331	MF,(RN14K2H221J)	220Ω,±5%,1/2W		
R332	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R333	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R334	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R335	MF,(RN14K2H221J)	220Ω,±5%,1/2W		
R336	CF,(ARD25T101J)	100Ω,±5%,1/4W		

( ): Manufacturer's part number

* : Selected at factory

Table 4-3 COMPONENT LIST FOR PATTERN GENERATOR CIRCUIT (422U10937 P.C. BOARD), (Transmitter Z3 Circuit Diagram 5)

CKT REF	DESCRIPTION	RATING		NOTE
R337	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R338	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R339	MF,(RN14K2H221J)	220Ω,±5%,1/2W		
R340	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R341	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R342	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R343	MF,(RN14K2H221J)	220Ω,±5%,1/2W		
R344	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R345	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R346	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R347	MF,(RN14K2H221J)	220Ω,±5%,1/2W		
R348	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R349	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R350	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R351	MF,(RN14K2H221J)	220Ω,±5%,1/2W		
R352	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R353	Not assigned			
R354	Not assigned			
R355	Not assigned			
R356	Not assigned			
R357	Not assigned			
R358	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R359	Not assigned			
R360	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R361	Not assigned			
R362	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R363	Not assigned			
R364	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R365	Not assigned			
R366	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R367	Not assigned			
R368	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R369	Not assigned			
R370	Not assigned			
R371	Not assigned			
R372	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R373	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R374	Not assigned			
R375	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R376	Not assigned			
R377	Not assigned			
R378	Not assigned			
R379	Not assigned			
R380	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R381	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R382	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R383	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R384	CF,(ARD25T101J)	100Ω,±5%,1/4W		

( ): Manufacturer's part number

* : Selected at factory

Table 4-3 COMPONENT LIST FOR PATTERN GENERATOR CIRCUIT (422U10937 P.C. BOARD), (Transmitter Z3 Circuit Diagram 5)

CKT REF	DESCRIPTION	RATING		NOTE
R385	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R386	CF,(ARD25T511J)	510Ω,±5%,1/4W		
R387	CF,(ARD25T122J)	1.2kΩ,±5%,1/4W		
R388	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R389	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R390	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R391	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R392	CF,(ARD25T511J)	510Ω,±5%,1/4W		
R393	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R394	Not assigned			
R395	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R396	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R397	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R398	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R399 to R410	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R411	Var,MF,(RJ-6P 2kΩ)	2kΩ,1/2W		
R412	Var,MF,(RJ-6P 2kΩ)	2kΩ,1/2W		
R413	Not assigned			
R414	Single in-line array, (IHR-8-681JA)	680Ω x 8,1/8W		
R415	Var,MF,(RJ-6P 1kΩ)	1kΩ,1/2W		
R416	CF,(ARD25T511J)	510Ω,±5%,1/4W		
R417	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R418	Not assigned			
R419	Not assigned			
R420	Not assigned			
R421	Not assigned			
R422	CF,(ARD25T131J)	130Ω,±5%,1/4W		
R423	CF,(ARD25T131J)	130Ω,±5%,1/4W		
R424	CF,(ARD25T820J)	82Ω,±5%,1/4W		
R425	CF,(ARD25T820J)	82Ω,±5%,1/4W		
R426	Not assigned			
R427	Not assigned			
R428	CF,(ARD25T511J)	510Ω,±5%,1/4W		
R429	CF,(ARD25T511J)	510Ω,±5%,1/4W		
R430	CF,(ARD25T131J)	130Ω,±5%,1/4W		
R431	CF,(ARD25T820J)	82Ω,±5%,1/4W		
R432	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R433	CF,(ARD25T511J)	510Ω,±5%,1/4W		
R434	CF,(ARD25T511J)	510Ω,±5%,1/4W		
R435	CF,(ARD25T511J)	510Ω,±5%,1/4W		
R436	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R437	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R438	Var,MF,(RJ-6P 500Ω)	500Ω,1/2W		
R439	CF,(ARD25T131J)	130Ω,±5%,1/4W		
R440	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		

( ): Manufacturer's part number

* : Selected at factory

Table 4-3 COMPONENT LIST FOR PATTERN GENERATOR CIRCUIT (422U10937 P.C. BOARD), (Transmitter Z3 Circuit Diagram 5)

CKT REF	DESCRIPTION	RATING		NOTE
R441	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R442	Var,MF,(RJ-6P 5kΩ)	5kΩ,1/2W		
R443	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R444	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R445	Var,MF,(RJ-6P 5kΩ)	5kΩ,1/2W		
R446	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R447	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R448	Var,MF,(RJ-6P 5kΩ)	5kΩ,1/2W		
R449	Not assigned			
R450	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R451	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R452	CF,(ARD25T511J)	510Ω,±5%,1/4W		
R453	CF,(ARD25T820J)	82Ω,±5%,1/4W		
R454	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R455	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R456	CF,(ARD25T271J)	270Ω,±5%,1/4W		
R457	CF,(ARD25T391J)	390Ω,±5%,1/4W		
R458	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
X 1	CRYSTAL OSCILLATOR, (44x80043)			44.736MHz

( ): Manufacturer's part number

* : Selected at factory

Table 4-4 COMPONENT LIST FOR FRONT PANEL CIRCUIT
(422U10870 P.C. BOARD), (Transmitter Z4 Circuit Diagram 6)

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Elect,(CE02C1V470)	47μF,±20%,35V		
C 2	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C 3	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C 4	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C 5	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C 6	Cer,(CK924F1H104Z)	0.1μF,±80/-20%,50V		
J 1	Connector, (HIF23A-26D-AA20S)			
Q 1	LED,(TLG226)			
Q 2	LED,(TLG226)			
Q 3	LED,(TLG226)			
Q 4	LED,(TLG226)			
Q 5	LED,(LN513GA)			
Q 6	LED,(LN513GA)			
Q 7	LED,(LN513GA)			
Q 8	LED,(LN342GPH)			
Q 9	LED,(LN342GPH)			
Q10	LED,(LN342GPH)			
Q11	LED,(LN342GPH)			
Q12	LED,(LN342GPH)			
Q13	LED,(LN342GPH)			
Q14	LED,(LN342GPH)			
Q15	LED,(LN342GPH)			
Q16	LED,(LN342GPH)			
Q17	LED,(TLG226)			
Q18	LED,(LN442YPH)			
Q19	Tr,(2SC2901)			
Q20	IC,(μPA79C)			
Q21	Not assigned			
Q22	IC,(74LS138)			
Q23	IC,(74LS138)			
Q24	Tr,(2SA1154)			
Q25	Tr,(2SA1154)			
Q26	Tr,(2SA1154)			
Q27	Tr,(2SA1154)			
Q28	Tr,(2SA1154)			
Q29	Tr,(2SA1154)			
Q30	Tr,(2SA1154)			
Q31	Tr,(2SA1154)			
Q32	LED,(TLG226)			
Q33	LED,(TLG226)			
Q34	LED,(TLG226)			

D

( ): Manufacturer's part number

* : Selected at factory

Table 4-4 COMPONENT LIST FOR FRONT PANEL CIRCUIT
(422U10870 P.C. BOARD), (Transmitter Z4 Circuit Diagram 6)

CKT REF	DESCRIPTION	RATING		NOTE
R 1	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R 2	CF,(ARD25T680J)	68Ω,±5%,1/4W		
R 3	CF,(ARD25T680J)	68Ω,±5%,1/4W		
R 4	CF,(ARD25T680J)	68Ω,±5%,1/4W		
R 5	CF,(ARD25T680J)	68Ω,±5%,1/4W		
R 6	CF,(ARD25T680J)	68Ω,±5%,1/4W		
R 7	CF,(ARD25T680J)	68Ω,±5%,1/4W		
R 8	CF,(ARD25T680J)	68Ω,±5%,1/4W		
R 9	CF,(ARD25T680J)	68Ω,±5%,1/4W		
R10	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R11	Not assigned			
R12	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R13	Single in-line array, (IHR-4-103JA)	10kΩ x 4,1/8W		
R14	Single in-line array, (IHR-7-331JB)	330Ω x 7,1/8W		
R15	Single in-line array, (IHR-6-103JA)	10kΩ x 6,1/8W		
R16	CF,(RG161N20SB 10kΩM)	10kΩ,±20%,1/2W		
S 1	Switch,(HL20-LSAB)			
S 2	Switch,(HL20-NS)			
S 3	Switch,(HL20-LSAB)			
S 4	Switch,(HL20-NS)			
S 5	Switch,(HL20-LSAB)			
S 6	Switch,(HL20-LSAB)			
S 7	Switch,(HL20-LSAB)			
S 8	Switch,(HL20-LSAB)			
S 9	Switch,(HL20-LSAB)			
S10	Switch,(HL20-LSAB)			
S11	Switch,(HL20-LSAB)			
S12	Switch,(HL20-LSAB)			
S13	Switch,(HL20-LSAB)			
S14	Switch,(HL20-NS)			
S15	Switch,(HL20-NS)			
S16	Switch,(HL20-NS)			
S17	Switch,(HL20-LSAB)			
S18	Switch,(HL20-LSAB)			
S19	Switch,(HL20-LSAB)			
S20	Switch,(HL20-NS)			
S21	Switch,(HL20-LSAB)			

D

( ): Manufacturer's part number

* : Selected at factory

Table 4-5 COMPONENT LIST FOR OPTION 01 TO 04 CIRCUIT (422U78588 P.C. BOARD), (Transmitter Z5 Circuit Diagram 7)

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C 2	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C 3	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C 4	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C 5	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C 6	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C 7	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C 8	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C 9	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C10	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C11	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C12	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C13	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C14	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C15	Elect,(CE04C1A470)	47μF,±20%,10V		
C16	Elect,(CE04C1A470)	47μF,±20%,10V		
C17	Elect,(CE04C1C330)	33μF,±20%,16V		
C18	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C19	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
J 1	Connector,(U-PB1519)			
K 1	Read relay,(PG1A-05D)			
K 2	Read relay,(PG1A-05D)			
K 3	Read relay,(PG1A-05D)			
K 4	Read relay,(PG1A-05D)			
Q 1	IC,(HD10125)			
Q 2	Not assigned			
Q 3	Not assigned			
Q 4	IC,(74S64)			
Q 5	IC,(74LS38)			
R 1	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R 2	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R 3	CF,(ARD25T153J)	15kΩ,±5%,1/4W		
R 4	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R 5	CF,(ARD25T153J)	15kΩ,±5%,1/4W		
R 6	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R 7	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R 8	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R 9	CF,(ARD25T153J)	15kΩ,±5%,1/4W		
R10	CF,(ARD25T153J)	15kΩ,±5%,1/4W		

E

( ): Manufacturer's part number

* : Selected at factory

Table 4-5 COMPONENT LIST FOR OPTION 01 TO 04 CIRCUIT (442U78588 P.C. BOARD), (Transmitter Z5 Circuit Diagram 7)

CKT REF	DESCRIPTION	RATING		NOTE
R11	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R12	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R13	Var,MF,(RJ-6P 5kΩJ)	5kΩ,1/2W		
R14	Var,MF,(RJ-6P 5kΩJ)	5kΩ,1/2W		
R15	Var,MF,(RJ-6P 5kΩJ)	5kΩ,1/2W		
R16	Var,MF,(RJ-6P 5kΩJ)	5kΩ,1/2W		
R17	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
Z 1	QUARTZ CRYSTAL, (44X67371)			OPT 01 to 04
Z 2	QUARTZ CRYSTAL, (44X67371)			OPT 01 to 04
Z 3	QUARTZ CRYSTAL, (44X67371)			OPT 01 to 04
Z 4	QUARTZ CRYSTAL, (44X67371)			OPT 01 to 04

E

( ): Manufacturer's part number

* : Selected at factory

Table 4-6 COMPONENT LIST FOR GP-IB INTERFACE CIRCUIT
(442U77923 P.C. BOARD), (Transmitter/Receiver Z6 Circuit Diagram 8)

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Elect,(CE04C1A470)	47μF,±20%,10V		
C 2	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C 3	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
J 1	Connector, (57LE-20240-27CD35)			
Q 1	IC,(74LS00)			
Q 2	IC,(74LS240)			
Q 3	IC,(8291A)			
Q 4	IC,(SN75160AN)			
Q 5	IC,(SN75161AN)			
Q 6	IC,(74LS245)			
Q 7	IC,(74LS244)			
R 1	Single in-line array, (IHR-8-103JA)	10kΩ x 8,1/8W		
R 2	Single in-line array, (IHR-8-103JA)	10kΩ x 8,1/8W		
R 3	Single in-line array, (IHR-8-103JA)	10kΩ x 8,1/8W		
R 4	Single in-line array, (IHR-4-103JA)	10kΩ x 4,1/8W		
S 1	Dip Switch,(BP-8)			

( ): Manufacturer's part number
* : Selected at factory

Table 4-7 COMPONENT LIST FOR RS-232C INTERFACE CIRCUIT
(442U79127 P.C. BOARD), (Transmitter/Receiver Z7 Circuit Diagram 9)

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(CC45CH1H151J)	150pF,±5%,50V		
C 2	Elect,(CE04C1A470)	47μF,±20%,10V		
C 3	Elect,(CE04C1C330)	33μF,±20%,16V		
C 4	Elect,(CE04C1C330)	33μF,±20%,16V		
C 5	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C 6	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C 7	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C 8	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C 9	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C10	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C11	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
J 1	Connector,(DB-25SA-J4)			
J 2	Connector,(DIC-149-3P)			
J 3	Connector,(DIC-149-3P)			
J 4	Connector,(DIC-149-3P)			
J 5	Connector,(DIC-128)			
J 6	Connector,(DIC-128)			
J 7	Connector,(DIC-128)			
Q 1	Di,(1S953)			
Q 2	Di,(1S953)			
Q 3	Di,(1S953)			
Q 4	Di,(1S953)			
Q 5	IC,(74LS365A)			
Q 6	IC,(74LS365A)			
Q 7	IC,(74LS245)			
Q 8	IC,(74LS32)			
Q 9	IC,(74LS02)			
Q10	IC,(74LS244)			
Q11	IC,(COM8146)			
Q12	IC,(74LS74A)			
Q13	IC,(μPD8251AC)			
Q14	IC,(SN75150P)			
Q15	IC,(SN75150P)			
Q16	IC,(SN75154P)			
Q17	IC,(SN75154P)			
R 1	Single in-line array, (IHR-8-103JA)	10kΩ x 8,1/8W		
R 2	Single in-line array, (IHR-8-103JA)	10kΩ x 8,1/8W		

( ): Manufacturer's part number

* : Selected at factory

Table 4-7 COMPONENT LIST FOR RS-232C INTERFACE CIRCUIT
(442U79127 P.C. BOARD), (Transmitter/Receiver Z7 Circuit Diagram 9)

CKT REF	DESCRIPTION	RATING		NOTE
R 3	Single in-line array, (IHR-8-103JA)	10kΩ x 8,1/8W		
R 4	Single in-line array, (IHR-6-103JA)	10kΩ x 6,1/8W		
S 1	Switch,(DIP-A(8))			
S 2	Rotary,(S-2031)			
X 1	CRYSTAL OSCILLATOR, (34X73400)	5.0688MHz		

( ): Manufacturer's part number
* : Selected at factory

Table 4-8 COMPONENT LIST FOR ME462B RECEIVER UNIT
(Receiver Unit Circuit Diagram 10)

CKT REF	DESCRIPTION	RATING		NOTE
G 1	Fan,(FB08B12L)			
J 1	Not assigned			
J 2	Connector,(DF1-15S-2.5R24)			
J 3	Terminal,(34E5848D)			
J 4	Terminal,(34E5848D)			
J 5	Terminal,(A-12)			
J 6	Connector,(PI-011-06F)			
J 7	Connector, (DF1-5S-2.5R24)			
J 8	Connector, (HIF3A5-34D-AA50S)			
J 9	Receptacle,(BNC-R-NI)			
J10	Receptacle,(BNC-R-NI)			
J11	Receptacle,(BNC-R-NI)			
J12	Receptacle,(BNC-R-NI)			
J13	Receptacle,(BNC-R-NI)			
J14	Receptacle,(BNC-R-NI)			
J15	Terminal,(10ϕ 349H7025D)			
J16	Terminal,(10ϕ 349H7025D)			
J17	Terminal,(10ϕ 349H7025D)			
J18	Terminal,(10ϕ 349H7025D)			
J19	Connector, (DF1-8S-2.5R24)			
J20	Connector, (HIF3A-20D-AA50S)			
J21	Receptacle,(BNC-R-NI)			
J22	Connector, (DF1-10S-2.5R24)			
J23	Connector, (DF1-10S-2.5R24)			
S 1	Pushbutton,(NE-15J(2)-2U)			
S 2	Toggle,(8E2011)			
S 3	Pushbutton,(8R1021)			

H

( ): Manufacturer's part number

* : Selected at factory

Table 4-8 COMPONENT LIST FOR ME462B RECEIVER UNIT
(Receiver Unit Circuit Diagram 10)

CKT REF	DESCRIPTION	RATING		NOTE
T 1	Power trans,(44T76814)			
Z 1	Inlet			****A (See Note.)
Z 2	CONTROL CIRCUIT, (422U10851 P.C. Board)			
Z 3	ERROR DETECTOR CIRCUIT,(422U10849 P.C. Board)			
Z 4	FRONT PANEL CIRCUIT, (422U10872 P.C. Board)			
Z 5	PRINTER			OPT 11
Z 6	GP-IB INTERFACE			OPT 31
Z 7	RS-232C INTERFACE			OPT 32
Z 8	SWITCH CIRCUIT, (442U79289 P.C. Board)			

H

( ): Manufacturer's part number

* : Selected at factory

Table 4-9 COMPONENT LIST FOR CONTROL CIRCUIT
(422U10851 P.C. BOARD), (Receiver Z2 Circuit Diagram 11)

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Not assigned			
C 2	Not assigned			
C 3	Not assigned			
C 4	Elect,(CE04C1C330)	33µF,±20%,16V		
C 5	Elect,(ECEM80R682L)	6800µF,±15%,80V		
C 6	Elect,(CE04C1J4R7)	4.7µF,±20%,63V		
C 7	Elect,(CE04C1A470)	47µF,±20%,10V		
C 8	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C 9	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C10	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C11	Elect,(ECEA1HG221S)	220µF,+50/-20%,50V		
C12	Elect,(ECEA1CG222S)	2200µF,+50/-20%,16V		
C13	Elect,(ECEA1CG102S)	1000µF,+50/-20%,16V		
C14	Elect,(ECEA10T102S)	1000µF,+50/-20%,10V		
C15	Elect,(ECEA2AG221S)	220µF,+50/-20%,100V		
C16	Elect,(ECEA1HG471S)	470µF,+50/-20%,50V		
C17	Elect,(CE04C1J101)	100µF,±20%,63V		
C18	Elect,(CE04C1J101)	100µF,±20%,63V		
C19	Elect,(ECET35R472SW)	4700µF,+50/-20%,35V		
C20	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C21	Elect,(CE04C1J4R7)	4.7µF,±20%,63V		
C22	Cer,(CK924C1H * M)	0.001 to 0.01µF, ±20%,50V		Q'ty 0 to 2, *
C23	Cer,(CK924C1H * M)	0.001 to 0.1µF, ±20%,50V		Q'ty 0 to 2, *
C24	Elect,(CE04C1J2R2)	2.2µF,±20%,63V		
C25	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		Q'ty 0 to 3
C26	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C27	Cer,(CK924C1H * M)	100pF to 0.01µF, ±20%,50V		Q'ty 0 to 2, *
C28	Plast,(ECQ-M1H104KZ)	0.1µF,±10%,50V		
C29	Not assigned			
C30	Elect,(CE04C1J2R2)	2.2µF,±20%,63V		
C31	Elect,(CE04C1J2R2)	2.2µF,±20%,63V		
C32	Not assigned			
C33	Not assigned			
C34	Not assigned			
C35	Cer,(CC924CH1H221J)	220pF,±5%,50V		
C36	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C37	Plast,(ECQ-P1 104FZ)	0.1µF,±1%,100V		
C38	Plast,(ECQ-M1H104KZ)	0.1µF,±10%,50V		
C39	Plast,(ECQ-M1H104KZ)	0.1µF,±10%,50V		
C40	Plast,(ECQ-M1H223KZ)	0.022µF,±10%,50V		
C41	Cer,(CC924CH1H820J)	82pF,±5%,50V		
C42	Var,cer,(TZ03R300A)	30pF,100V		

( ): Manufacturer's part number

* : Selected at factory

Table 4-9 COMPONENT LIST FOR CONTROL CIRCUIT
(422U10851 P.C. BOARD), (Receiver Z2 Circuit Diagram 11)

CKT REF	DESCRIPTION	RATING		NOTE
C43	Elect,(CE04C1J2R2)	2.2μF,±20%,63V		
C44	Elect,(CE04C1J4R7)	4.7μF,±20%,63V		
C45	Elect,(CE04C1A470)	47μF,±20%,10V		
C46	Elect,(CE04C1C330)	33μF,±20%,16V		
C47	Elect,(CE04C1C330)	33μF,±20%,16V		
C48	Elect,(CE04C1A470)	47μF,±20%,10V		
C49	Elect,(CE04C1V470)	47μF,±20%,35V		
C50	Elect,(CE04C1A470)	47μF,±20%,10V		
C51 to C73	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
F 1	Fuse,(MF51NN250V5ADC01)	5A,250V		
F 2	Fuse,(MF51NN250V5ADC01)	5A,250V		
F 3	Fuse,(MF51NN250V5ADC01)	1A,250V		
F 4	Fuse,(MF51NN250V1ADC01)	1A,250V		
F 5	Fuse,(MF51NN250V5ADC01)	5A,250V		
F 6	Fuse,(SF-96U)	96°C,10A,250V		
J 1	Connector, (DF1-15P-2.5DSA)			
J 2	Connector, (HIF3-40P-2.54DSA)			
J 3	Connector, (HIF3-40P-2.54DSA)			
J 4	Connector, (HIF3-34P-2.54DSA)			
J 5	Connector, (HIF3-20P-2.54DSA)			
J 6	Connector, (DF1-8P-2.5DSA)			
K 1	Relay,(G2L-113P-V(12V))			
K 2	Relay,(G2R-117P-V(12V))			
K 3	Relay,(PG1C-05D)			
L 1	Coil,(SKL-202A)	50μH		
L 2	Coil,(SC-10-100)	1mH		
L 3	Coil,(HP-024)	950μH		
L 4	Coil,(HP-023)	300μH		
L 5	Coil,(LH1-471K)	470μH		
M 1	Timer,(TM-0)			

J

( ): Manufacturer's part number

* : Selected at factory

Table 4-9 COMPONENT LIST FOR CONTROL CIRCUIT
(422U10851 P.C. BOARD), (Receiver Z2 Circuit Diagram 11)

CKT REF	DESCRIPTION	RATING		NOTE
Q 1	IC,(μPC451C)			
Q 2	Di,breakdown,(02BZ2.2)	1.88 to 2.56V,250mW		
Q 3	Rectifier,(D5FB20)			
Q 4	Rectifier,(RB-152-LFB)			
Q 5	IC,(μPC14324H)			
Q 6	IC,(μPC16312H)			
Q 7	Di,breakdown,(RD5.1E)	4.8 to 5.37V,400mW		
Q 8	Di,breakdown,(RD5.1E)	4.8 to 5.37V,400mW		
Q 9	Photo coupler,(PC614)			
Q10	Di,(S10SC4M)			
Q11	Di,breakdown,(RD13E)	12.11 to 13.66V, 400mW		
Q12	Tr,(2SC1008)			
Q13	Di,(V03G)			
Q14	Photo coupler,(PC618)			
Q15	Tr,(2SC2718)			
Q16	Not assigned			
Q17	Di,(1S955)			
Q18	Di,(1S955)			
Q19	Tr,(2SA780A)			
Q20	Tr,(2SA780A)			
Q21	IC,(μPC1042C)			
Q22	Di,(1S953)			
Q23	Di,(1S953)			
Q24	Di,(1S955)			
Q25	Di,(1S955)			
Q26	Di,(V03G)			
Q27	Di,(1S955)			
Q28	Di,(1S955)			
Q29	Di,(V03G)			
Q30	Tr,(2SC3164)			
Q31	Tr,(2SC3164)			
Q32	Di,(S5KC20H)			
Q33	Not assigned			
Q34	Di,(S5KC20HR)			
Q35	Di,(S5KC20H)			
Q36	Di,(1S1300)			
Q37	Not assigned			
Q38	Di,breakdown,(RD13E)	12.11 to 13.66V,400mW		
Q39	Tr,(2SC1826S)			
Q40	Di,1S953)			
Q41	Di,(1SS99)			
Q42	Di,breakdown,(RD13E)	12.11 to 13.66V,400mW		
Q43	Tr,(2SC1826S)			
Q44	Di,(1S953)			
Q45	Di,(1S953)			

( ): Manufacturer's part number

* : Selected at factory

Table 4-9 COMPONENT LIST FOR CONTROL CIRCUIT
(422U10851 P.C. BOARD), (Receiver Z2 Circuit Diagram 11)

CKT REF	DESCRIPTION	RATING		NOTE
Q46	Di,(1SS99)			
Q47	Di,(1SS99)			
Q48	Not assigned			
Q49	Not assigned			
Q50	IC,(μPD8279C-2)			
Q51	IC,(μPD8253C-2)			
Q52	IC,(μPD8253C-2)			
Q53	IC,(μPD8253C-2)			
Q54	IC,(74LS74A)			
Q55	IC,(74LS08)			
Q56	IC,(μ74LS04)			
Q57	IC,(74LS390)			
Q58	IC,(74LS04)			
Q59	IC,(74LS245)			
Q60	IC,(74LS245)			
Q61	IC,(74LS32)			
Q62	IC,(74LS32)			
Q63	IC,(74LS157)			
Q64	IC,(74LS00)			
Q65	IC,(74LS04)			
Q66	IC,(74LS365A)			
Q67	IC,(μPD8259AC-2)			
Q68	IC,(7437)			
Q69	IC,(μPD780C-1)			
Q70	IC,(74LS245)			
Q71	IC,(74LS139)			
Q72	IC,(74LS123)			
Q73	IC,(74LS155)			
Q74	IC,(μPD7002C)			
Q75	IC,(μPC151C)			
Q76	IC,(μPD8279C-2)			
Q77	IC,(74LS74A)			
Q78	IC,(74LS42)			
Q79	IC,(74LS14)			
Q80	IC,(74LS04)			
Q81	IC,(μPD8255AC-2)			
Q82	IC,(74LS365A)			
Q83	IC,(74LS244)			
Q84	IC,(RP5C15)			
Q85	IC,(TC5565PL-15)			
Q86	IC,(HN4827128G-25)			
Q87	IC,(HN4827128G-25)			
Q88	IC,(TL7705CP)			
Q89	IC,(TC4093BP)			

( ): Manufacturer's part number

* : Selected at factory

Table 4-9 COMPONENT LIST FOR CONTROL CIRCUIT
(422U10851 P.C. BOARD), (Receiver Z2 Circuit Diagram 11)

CKT REF	DESCRIPTION	RATING		NOTE
R 1	CF,(RS1FB 3.3kΩJ)	3.3kΩ,±5%,1W		
R 2	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R 3	CF,(ARD25T560J)	56Ω,±5%,1/4W		
R 4	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R 5	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R 6	CF,(ARD25T * J)	4.7k to 100kΩ,±5%, 1/4W		*
R 7	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R 8	CF,(ARD25T * J)	10k to 1MΩ,±5%,1/4W		
R 9	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R10	MF,(RS2FB 2.2kΩJ)	2.2kΩ,±5%,1/4W		
R11	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R12	MF,(RN14K2H682J)	6.8kΩ,±5%,1/2W		
R13	Var,MF,(RJ-6P 1kΩ)	1kΩ,1/2W		
R14	CF,(ERF-5SK-3R3)	3.3Ω,±10%,5W		
R15	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R16	MF,(RS2FB 1kΩJ)	1kΩ,±5%,2W		
R17	MF,(RS2FB 1kΩJ)	1kΩ,±5%,2W		
R18	Not assigned			
R19	Not assigned			
R20	CF,(ERF-2SK-5R1)	5.1Ω,±10%,2W		
R21	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R22	CF,(ARD25T * J)	1k to 100kΩ,±5%, 1/4W		Q'ty 1 to 3, *
R23	CF,(ARD25T473J)	47kΩ,±5%,1/4W		
R24	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R25	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R26	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R27	CF,(ARD25T * J)	22k to 100kΩ,±5%, 1/4W		Q'ty 1 to 3, *
R28	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R29	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R30	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R31	CF,(ARD25T473J)	47kΩ,±5%,1/4W		
R32	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R33	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R34	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R35	CF,(ARD25T * J)	6.8 to 22Ω,±5%,1/4W		Q'ty 0 to 2, *
R36	CF,(ARD25T * J)	10 to 100Ω,±5%,1/4W		Q'ty 1 or 2, *
R37	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R38	CF,(ARD25T * J)	6.8 to 22Ω,±5%,1/4W		Q'ty 0 to 2, *
R39	CF,(ARD25T * J)	10 to 100Ω,±5%,1/4W		Q'ty 1 or 2, *
R40	Not assigned			

( ): Manufacturer's part number

* : Selected at factory

Table 4-9 COMPONENT LIST FOR CONTROL CIRCUIT
(422U10851 P.C. BOARD), (Receiver Z2 Circuit Diagram 11)

CKT REF	DESCRIPTION	RATING		NOTE
R41	Not assigned			
R42	Not assigned			
R43	Not assigned			
R44	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R45	MF,(RN14K2H332J)	3.3kΩ,±5%,1/2W		
R46	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R47	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R48	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R49	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R50	CF,(ARD25T121J)	120Ω,±5%,1/4W		
R51	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R52	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R53	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R54	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R55	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R56	CF,(ARD25T100J)	10Ω,±5%,1/4W		
R57	Single in-line array, (IHR-8-104JA)	100kΩ x 8,1/8W		
R58	Single in-line array, (IHR-6-103JA)	10kΩ x 6,1/8W		
R59	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R60	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R61	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R62	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R63	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R64	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R65	CF,(ARD25T122J)	1.2kΩ,±5%,1/4W		
R66	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R67	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R68	Var,MF,(RJ-6P 1kΩ)	1kΩ,1/2W		
R69	Not assigned			
R70	Single in-line array, (IHR-6-103JA)	10kΩ x 6,1/8W		
R71	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R72	Single in-line array, (IHR-6-103JA)	10kΩ x 6,1/8W		
R73	Single in-line array, (IHR-6-103JA)	10kΩ x 6,1/8W		
S 1	Switch,(DIP-A(4))			
T 1	Trans,(44T75381)			
T 2	Trans,(44T75381)			
T 3	Trans,(44T76820)			

( ): Manufacturer's part number
* : Selected at factory

Table 4-9 COMPONENT LIST FOR CONTROL CIRCUIT
(422U10851 P.C. BOARD), (Receiver Z2 Circuit Diagram 11)

CKT REF	DESCRIPTION	RATING		NOTE
X 1	Crystal Oscillator, (MX-38)	32.768KHz		
Z 1	QUARTZ CRYSTAL,(TD308A)	6MHz		
Z 2	BATTERY,(GB150-3)	3.6V		

J

( ): Manufacturer's part number

* : Selected at factory

Table 4-10 COMPONENT LIST FOR ERROR DETECTION CIRCUIT (422U10849 P.C. BOARD), (Receiver Z3 Circuit Diagram 12)

CKT REF	DESCRIPTION	RATING		NOTE
C 1 to C27	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C28	Elect,(CE04C1C330)	33μF,±20%,16V		
C29 to C46	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C47	Elect,(CE04C1C330)	33μF,±20%,16V		
C48	Cer,(CC924CH1H471J)	470pF,±5%,50V		
C49	Cer,(CC924CH1H510J)	51pF,±5%,50V		
C50	Var,Cer,(TZ03T110A)	11pF,100V		
C51	Cer,(RD340CK010CY50)	1pF,±0.25pF,50V		
C52 to C67	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C68	Plast,(ECQ-M1H102KZ)	1000pF,±10%,50V		
C69	Elect,(CE04C1J2R2)	2.2μF,±20%,63V		
C70	Elect,(CE04C1J4R7)	4.7μF,±20%,63V		
C71	Plast,(ECQ-M1H102KZ)	1000pF,±10%,50V		
C72	Elect,(CE04C1J4R7)	4.7μF,±20%,63V		
C73	Elect,(CE04C1J2R2)	2.2μF,±20%,63V		
C74	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V		
C75	Cer,(CC924CH1H101J)	100pF,±5%,50V		
C76	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V		
C77	Cer,(CC924CH1H471J)	470pF,±5%,50V		
C78	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C79	Cer,(CC924CH1H471J)	470pF,±5%,50V		
C80	Cer,(CC924CH1H471J)	470pF,±5%,50V		
C81	Elect,(CE04C1J2R2)	2.2μF,±20%,63V		
C82	Elect,(CE04C1A101)	100μF,±20%,10V		
C83	Elect,(CE04C1C470)	47μF,±20%,16V		
C84	Plast,(ECQ-M1H102KZ)	1000pF,±10%,50V		
C85	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C86	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C87	Cer,(CC924CH1H471J)	470pF,±5%,50V		
C88 to C142	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C143	Cer,(CC924CH1H471J)	470pF,±5%,50V		
C144	Cer,(CC924CH1H471J)	470pF,±5%,50V		
C145	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C146	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C147	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C148	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C149	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C150	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C151	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		

( ): Manufacturer's part number

* : Selected at factory

Table 4-10 COMPONENT LIST FOR ERROR DETECTION CIRCUIT (422U10849 P.C. BOARD), (Receiver Z3 Circuit Diagram 12)

CKT REF	DESCRIPTION	RATING		NOTE
C152	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C153	Elect,(CE04C1C330)	33μF,±20%,16V		
C154	Elect,(CE04C1C330)	33μF,±20%,16V		
C155	Elect,(CE04C1A470)	47μF,±20%,10V		
C156	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
J 1	Connector,(J12-2)			
J 2	Receptacle,(BNC-R-NI)			
J 3	Receptacle,(BNC-R-NI)			
J 4	Connector,(PI011-06M)			
J 5	Plug,(DF1-5P-2.5DSA)			
J 6	Connector, (HIF23A-40D-AA20S)			
J 7	Terminal,(DIC-149-3P)			
J 8	Terminal,(DIC-149-3P)			
J 9	Terminal,(DIC-149-3P)			
J 10	Terminal,(DIC-149-3P)			
J 11	Terminal,(DIC-149-3P)			
J 12	Connector,(DIC-128)			
J 13	Connector,(DIC-128)			
J 14	Connector,(DIC-128)			
J 15	Connector,(DIC-128)			
J 16	Connector,(DIC-128)			
J 17	Plug,(DF1-10P-2.5DSA)			
K 1	Relay,(PG1C-05)			
K 2	Relay,(PG1C-05)			
K 3	Relay,(PG1C-05)			
K 4	Relay,(PG1C-05)			
K 5	Buzzer,(CMB-06)			
L 1	Coil,(34L55686G)	0.358μH		
Q 1	Tr,(2SC1907)			
Q 2	Tr,(2SC1907)			
Q 3	Tr,(2SC1907)			
Q 4	Tr,(2SC1907)			
Q 5	Tr,(2SC1907)			
Q 6	Tr,(2SC1907)			
Q 7	Tr,(2SC1907)			
Q 8	Tr,(2SC1907)			
I Q 9	Tr,(2SC2498)			

( ): Manufacturer's part number

* : Selected at factory

Table 4-10 COMPONENT LIST FOR ERROR DETECTION CIRCUIT
(422U10849 P.C. BOARD), (Receiver Z3 Circuit Diagram 12)

CKT REF	DESCRIPTION	RATING		NOTE
Q10	Tr,(2SC1907)			
Q11	Di,(FC-51M)			
Q12	Di,(FC-51M)			
Q13	Di,(FC-51M)			
Q14	Di,(1SS99)			
Q15	Di,(1SS99)			
Q16	IC,(μPC251C)			
Q17	Di,(1S953)			
Q18	Not assigned			
Q19	Not assigned			
Q20	Not assigned			
Q21	Not assigned			
Q22	Not assigned			
Q23	Not assigned			
Q24	Not assigned			
Q25	Tr,(2SC1907)			
Q26	Tr,(2SC2498)			
Q27	Tr,(2SC1907)			
Q28	Tr,(2SC2498)			
Q29	Tr,(2SC1907)			
Q30	Tr,(2SC2498)			
Q31	Tr,(2SC2498)			
Q32	Tr,(2SC2498)			
Q33	Tr,(2SC2498)			
Q34	Tr,(2SC1907)			
Q35	Tr,(2SC1907)			
Q36	Tr,(2SC1907)			
Q37	Tr,(2SC2498)			
Q38	Tr,(2SC2498)			
Q39	FET,(3SK-59BL)			
Q40	Di,(1S953)			
Q41	Di,(1S953)			
Q42	Di,(1S953)			
Q43	Di,(1SS99)			
Q44	Di,(1SS99)			
Q45	Di,(1S953)			
Q46	Di,(1S953)			
Q47	Di,(1S953)			
Q48	Di,breakdown,(RD5.1E)	4.8 to 5.37V,400mW		
Q49	Di,(1S953)			
Q50	Not assigned			
Q51	Di,breakdown,(RD5.1E)	4.8 to 5.37V,400mW		
Q52	Tr,(2SC1907)			
Q53	Tr,(2SC1907)			
Q54	Di,breakdown,(RD5.1E)	4.8 to 5.37V,400mW		
Q55	Di,breakdown,(RD5.1E)	4.8 to 5.37V,400mW		I

( ): Manufacturer's part number

* : Selected at factory

Table 4-10 COMPONENT LIST FOR ERROR DETECTION CIRCUIT (422U10849 P.C. BOARD), (Receiver Z3 Circuit Diagram 12)

CKT REF	DESCRIPTION	RATING		NOTE
Q56	Tr,(2SC2498)			
Q57	Tr,(2SC2498)			
Q58	Tr,(2SC2498)			
Q59	Tr,(2SC2498)			
Q60	Tr,(2SC1907)			
Q61	Tr,(2SC1907)			
Q62	Tr,(2SC1907)			
Q63	Tr,(2SC1907)			
Q64	Tr,(2SC1907)			
Q65	Not assigned			
Q66	Di,(1S953)			
Q67	Di,(1S953)			
Q68	Di,(1S953)			
Q69	Di,(1S953)			
Q70	Not assigned)			
Q71	IC,(74LS123)			
Q72	IC,(74LS00)			
Q73	IC,(74S00)			
Q74	IC,(74LS123)			
Q75	IC,(74LS38)			
Q76	IC,(74S04)			
Q77	IC,(74LS393)			
Q78	IC,(74LS393)			
Q79	IC,(74LS175)			
Q80	IC,(74LS10)			
Q81	IC,(74LS112A)			
Q82	IC,(74LS175)			
Q83	IC,(74F161APC)			
Q84	IC,(74LS123)			
Q85	IC,(74LS123)			
Q86	IC,(74LS00)			
Q87	IC,(74LS04)			
Q88	IC,(74S64)			
Q89	IC,(74S00)			
Q90	IC,(74LS138)			
Q91	IC,(74LS138)			
Q92	IC,(74LS374)			
Q93	IC,(74LS374)			
Q94	IC,(74LS175)			
Q95	IC,(74LS112A)			
Q96	IC,(74LS08)			
Q97	IC,(74LS163A)			
Q98	IC,(74S20)			
Q99	IC,(74F374PC)			
Q100	IC,(74F86PC)			
I Q101	IC,(74LS123)			

( ): Manufacturer's part number

* : Selected at factory

Table 4-10 COMPONENT LIST FOR ERROR DETECTION CIRCUIT (422U10849 P.C. BOARD), (Receiver Z3 Circuit Diagram 12)

CKT REF	DESCRIPTION	RATING		NOTE
Q102	IC,(74LS74A)			
Q103	IC,(74S74)			
Q104	IC,(74LS74A)			
Q105	IC,(74LS14)			
Q106	IC,(74LS240)			
Q107	IC,(74LS374)			
Q108	IC,(74LS374)			
Q109	IC,(74LS240)			
Q110	IC,(74LS20)			
Q111	IC,(74LS74A)			
Q112	IC,(74LS86)			
Q113	IC,(74S112)			
Q114	IC,(74F374PC)			
Q115	IC,(74F161APC)			
Q116	IC,(74S74)			
Q117	IC,(74S00)			
Q118	IC,(74F191PC)			
Q119	IC,(74S02)			
Q120	IC,(74S00)			
Q121	IC,(74S02)			
Q122	IC,(74F175PC)			
Q123	IC,(74F191PC)			
Q124	IC,(74S74)			
Q125	IC,(74LS11)			
Q126	IC,(74LS74A)			
Q127	IC,(74LS00)			
Q128	IC,(74S51)			
Q129	IC,(74S74)			
Q130	IC,(74LS390)			
Q131	IC,(74F175PC)			
Q132	IC,(74LS367A)			
Q133	IC,(74LS373)			
Q134	IC,(74LS373)			
Q135	IC,(74LS373)			
Q136	IC,(74LS367A)			
Q137	IC,(74LS373)			
Q138	IC,(74LS373)			
Q139	IC,(74LS373)			
Q140	IC,(74LS74A)			
Q141	IC,(74LS74A)			
Q142	IC,(74S02)			
Q143	IC,(74F175PC)			
Q144	IC,(74F11PC)			
Q145	IC,(74S74)			
Q146	IC,(74S00)			
Q147	IC,(74S04)			

I

( ): Manufacturer's part number

* : Selected at factory

Table 4-10 COMPONENT LIST FOR ERROR DETECTION CIRCUIT (422U10849 P.C. BOARD), (Receiver Z3 Circuit Diagram 12)

CKT REF	DESCRIPTION	RATING		NOTE
Q148	IC,(74LS161A)			
Q149	IC,(74LS161A)			
Q150	IC,(74LS161A)			
Q151	IC,(74LS393)			
Q152	IC,(74LS161A)			
Q153	IC,(74LS161A)			
Q154	IC,(74LS161A)			
Q155	IC,(74LS393)			
Q156	IC,(74LS74A)			
Q157	IC,(74F10PC)			
Q158	IC,(74F175PC)			
Q159	IC,(74F86PC)			
Q160	IC,(74S51)			
Q161	IC,(74S112)			
Q162	IC,(74S04)			
Q163	IC,(HD10125)			
Q164	IC,(TD62003P)			
Q165	IC,(74LS161A)			
Q166	IC,(74F175PC)			
Q167	IC,(74F175PC)			
Q168	IC,(74F175PC)			
Q169	IC,(74S00)			
Q170	IC,(74S10)			
Q171	IC,(74S74)			
Q172	IC,(74LS293)			
Q173	IC,(74F191PC)			
Q174	IC,(74S74)			
Q175	IC,(74F32PC)			
Q176	IC,(74S74)			
Q177	IC,(74S74)			
Q178	IC,(HD10116)			
Q179	IC,(HD10125)			
R 1	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R 2	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R 3	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R 4	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R 5	CF,(ARD25T561J)	560Ω,±5%,1/4W		
R 6	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R 7	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R 8	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R 9	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R 10	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R 11	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R 12	CF,(ARD25T221J)	220Ω,±5%,1/4W		

( ): Manufacturer's part number

* : Selected at factory

Table 4-10 COMPONENT LIST FOR ERROR DETECTION CIRCUIT (422U10849 P.C. BOARD), (Receiver Z3 Circuit Diagram 12)

CKT REF	DESCRIPTION	RATING		NOTE
R13	CF,(ARD25T181J)	180Ω,±5%,1/4W		
R14	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R15	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R16	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R17	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R18	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R19	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R20	CF,(ARD25T150J)	15Ω,±5%,1/4W		
R21	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R22	CF,(ARD25T271J)	270Ω,±5%,1/4W		
R23	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R24	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R25	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R26	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R27	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R28	CF,(ARD25T333J)	33kΩ,±5%,1/4W		
R29	CF,(ARD25T333J)	33kΩ,±5%,1/4W		
R30	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R31	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R32	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R33	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R34	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R35	CF,(ARD25T220J)	22Ω,±5%,1/4W		
R36	CF,(ARD25T391J)	390Ω,±5%,1/4W		
R37	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R38	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R39	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R40	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R41	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R42	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R43	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R44	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R45	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R46	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R47	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R48	Var,MF,(RJ-6P 1kΩ)	1kΩ,1/2W		
R49	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R50	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R51	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R52	Var,MF,(RJ-6P 2kΩ)	2kΩ,1/2W		
R53	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R54	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R55	CF,(ARD25T391J)	390Ω,±5%,1/4W		
R56	CF,(ARD25T511J)	510Ω,±5%,1/4W		
R57	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R58	CF,(ARD25T182J)	1.8kΩ,±5%,1/4W		

( ): Manufacturer's part number

* : Selected at factory

Table 4-10 COMPONENT LIST FOR ERROR DETECTION CIRCUIT (422U10849 P.C. BOARD), (Receiver Z3 Circuit Diagram 12)

CKT REF	DESCRIPTION	RATING		NOTE
R59	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R60	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R61	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R62	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R63	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R64	CF,(ARD25T330J)	33Ω,±5%,1/4W		
R65	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R66	CF,(ARD25T181J)	180Ω,±5%,1/4W		
R67	CF,(ARD25T822J)	8.2kΩ,±5%,1/4W		
R68	CF,(ARD25T123J)	12kΩ,±5%,1/4W		
R69	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R70	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R71	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R72	CF,(ARD25T330J)	33Ω,±5%,1/4W		
R73	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R74	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R75	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W		
R76	CF,(ARD25T153J)	15kΩ,±5%,1/4W		
R77	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R78	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R79	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R80	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R81	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R82	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R83	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R84	CF,(ARD25T391J)	390Ω,±5%,1/4W		
R85	Var,MF,(RJ-6P 1kΩ)	1kΩ,1/2W		
R86	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R87	CF,(ARD25T392J)	3.9kΩ,±5%,1/4W		
R88	Var,MF,(RJ-6P 1kΩ)	1kΩ,1/2W		
R89	CF,(ARD25T122J)	1.2kΩ,±5%,1/4W		
R90	CF,(ARD25T272J)	2.7kΩ,±5%,1/4W		
R91	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R92	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R93	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R94	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R95	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R96	Var,MF,(RJ-6P 1kΩ)	1kΩ,1/2W		
R97	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R98	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R99	Not assigned			
R100	Not assigned			
R101	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R102	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R103	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R104	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		

( ): Manufacturer's part number

* : Selected at factory

Table 4-10 COMPONENT LIST FOR ERROR DETECTION CIRCUIT (422U10849 P.C. BOARD), (Receiver Z3 Circuit Diagram 12)

CKT REF	DESCRIPTION	RATING		NOTE
R105	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R106	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R107	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W		
R108	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R109	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R110	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R111	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R112	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R113	CF,(ARD25T391J)	390Ω,±5%,1/4W		
R114	Var,MF,(RJ-6P 1kΩ)	1kΩ,1/2W		
R115	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R116	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R117	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R118	CF,(RS2FB470J)	47Ω,±5%,2W		
R119	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R120	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R121	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R122	Not assigned			
R123	Not assigned			
R124	MF,(RN14K2E1000D)	100Ω,±0.5%,1/4W		
R125	MF,(RN14K2E1000D)	100Ω,±0.5%,1/4W		
R126	MF,(RN14K2E3010D)	301Ω,±0.5%,1/4W		
R127	MF,(RN14K2E3010D)	301Ω,±0.5%,1/4W		
R128	Var,MF,(RJ-6P 500Ω)	500Ω,1/2W		
R129	CF,(ARD25T511J)	510Ω,±5%,1/4W		
R130	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R131	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R132	Var,MF,(RJ-6P 500Ω)	500Ω,1/2W		
R133	CF,(ARD25T511J)	510Ω,±5%,1/4W		
R134	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R135	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R136	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R137	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R138	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R139	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R140	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R141	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R142	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R143	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R144	Var,MF,(RJ-6P 5kΩ)	5kΩ,1/2W		
R145	Var,MF,(RJ-6P 2kΩ)	2kΩ,1/2W		
R146	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R147	CF,(ARD25T272J)	2.7kΩ,±5%,1/4W		
R148	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R149	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R150	CF,(ARD25T151J)	150Ω,±5%,1/4W		

( ): Manufacturer's part number

* : Selected at factory

Table 4-10 COMPONENT LIST FOR ERROR DETECTION CIRCUIT (422U10849 P.C. BOARD), (Receiver Z3 Circuit Diagram 12)

CKT REF	DESCRIPTION	RATING		NOTE
R151	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R152	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R153	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R154	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R155	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R156	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R157	Var,MF,(RJ-6P 5kΩ)	5kΩ,1/2W		
R158	Var,MF,(RJ-6P 2kΩ)	2kΩ,1/2W		
R159	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R160	CF,(ARD25T272J)	2.7kΩ,±5%,1/4W		
R161	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R162	Not assigned			
R163	Not assigned			
R164	Not assigned			
R165	Not assigned			
R166	Not assigned			
R167	Not assigned			
R168	CF,(ARD25T224J)	220kΩ,±5%,1/4W		
R169	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R170	CF,(ARD25T224J)	220kΩ,±5%,1/4W		
R171	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R172	CF,(ARD25T154J)	150kΩ,±5%,1/4W		
R173	CF,(ARD25T224J)	220kΩ,±5%,1/4W		
R174	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R175	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R176	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R177	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R178	Not assigned			
R179	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R180	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R181	CF,(ARD25T154J)	150kΩ,±5%,1/4W		
R182	CF,(ARD25T392J)	3.9kΩ,±5%,1/4W		
R183	CF,(ARD25T392J)	3.9kΩ,±5%,1/4W		
R184	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R185	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R186	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R187	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R188	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R189	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R190	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R191	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R192	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R193	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R194	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R195	CF,(ARD25T101J)	100Ω,±5%,1/4W		
I R196	CF,(ARD25T102J)	1kΩ,±5%,1/4W		

( ): Manufacturer's part number

* : Selected at factory

Table 4-10 COMPONENT LIST FOR ERROR DETECTION CIRCUIT (422U10849 P.C. BOARD), (Receiver Z3 Circuit Diagram 12)

CKT REF	DESCRIPTION	RATING		NOTE
R197	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R198	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R199	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R200	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R201	Single in-line array, (IHR-8-103JA)	10kΩ x 8,1/8W		
R202	CF,(ARD25T220J)	22Ω,±5%,1/4W		
R203	CF,(ARD25T220J)	22Ω,±5%,1/4W		
R204	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R205	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R206	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		

( ): Manufacturer's part number

* : Selected at factory

Table 4-11 COMPONENT LIST FOR FRONT PANEL CIRCUIT
(422U10872 P.C. BOARD), (Receiver Z4 Circuit Diagram 13)

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Elect,(CE04C1A101)	100μF,±20%,10V		
C 2	Elect,(CE04C1A470)	47μF,±20%,10V		
C 3	Elect,(CE04C1A101)	100μF,±20%,10V		
J 1	Connector, (HIF23A-40D-AA10S)			
Q 1	LED,(LN513GA)			
Q 2	LED,(LN513GA)			
Q 3	LED,(LN513GA)			
Q 4	LED,(LN513GA)			
Q 5	LED,(LN513GA)			
Q 6	LED,(LN513GA)			
Q 7	LED,(LN513GA)			
Q 8	LED,(LN513GA)			
Q 9	LED,(LN514GA)			
Q10	LED,(LN514GA)			
Q11	LED,(LN514GA)			
Q12	LED,(LN514GA)			
Q13	LED,(LN514GA)			
Q14	LED,(LN442YPH)			
Q15	LED,(LN442YPH)			
Q16	LED,(LN442YPH)			
Q17	LED,(LN442YPH)			
Q18	LED,(LN442YPH)			
Q19	LED,(LN242RPH)			
Q20	LED,(LN242RPH)			
Q21	LED,(LN242RPH)			
Q22	LED,(LN242RPH)			
Q23	LED,(LN442YPH)			
Q24	LED,(TLG226)			
Q25 to Q44	Tr,(2SA1154)			
Q45	Tr,(2SC2901)			
Q46	Tr,(2SC2901)			
Q47	LED,(TLG226)			
Q48	LED,(TLG226)			
Q49	LED,(TLG226)			
Q50	IC,(74LS42)			
Q51	IC,(74LS42)			
Q52	IC,(μPA79C)			
Q53	IC,(μPA79C)			
Q54	IC,(74LS138)			

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( ): Manufacturer's part number

* : Selected at factory

Table 4-11 COMPONENT LIST FOR FRONT PANEL CIRCUIT
(422U10872 P.C. BOARD), (Receiver Z4 Circuit Diagram 13)

CKT REF	DESCRIPTION	RATING		NOTE
Q55	IC,(74LS10)			
R 1	Single in-line array, (IHR-8-332JA)	3.3kΩ x 8,1/8W		
R 2	Single in-line array, (IHR-8-332JA)	3.3kΩ x 8,1/8W		
R 3	Single in-line array, (IHR-7-330JB)	33Ω x 7,1/8W		
R 4	Single in-line array, (IHR-7-220JB)	22Ω x 7,1/8W		
R 5	Not assigned			
R 6	Single in-line array, (IHR-7-330JB)	33Ω x 7,1/8W		
R 7	Single in-line array, (IHR-8-103JA)	10kΩ x 8,1/8W		
R 8	Not assigned			
R 9	Single in-line array, (IHR-7-331JB)	330Ω x 7,1/8W		
R10	Single in-line array, (IHR-7-331JB)	330Ω x 7,1/8W		
R11	Single in-line array, (IHR-7-331JB)	330Ω x 7,1/8W		
R12	Single in-line array, (IHR-4-103JA)	10kΩ x 4,1/8W		
R13	Single in-line array, (IHR-6-103JA)	10kΩ x 6,1/8W		
R14	CF,(ARD25T330J)	33Ω,±5%,1/4W		
R15	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R16	CF,(ARD25T220J)	22Ω,±5%,1/4W		
R17	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R18	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R19	Single in-line array, (IHR-4-103JA)	10kΩ x 4,1/8W		
R20	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
S 1	Switch,(HL20-LSAB)			
S 2	Switch,(HL20-LSAB)			
S 3	Switch,(HL20-LSAB)			
S 4	Switch,(HL20-LSAB)			
S 5	Switch,(HL20-LSAB)			
S 6	Switch,(HL20-NS)			
S 7 to S20	Switch,(HL20-LSAB)			
S21	Switch,(HL20-NS)			

( ): Manufacturer's part number

* : Selected at factory

Table 4-11 COMPONENT LIST FOR FRONT PANEL CIRCUIT
(422U10872 P.C. BOARD), (Receiver Z4 Circuit Diagram 13)

CKT REF	DESCRIPTION	RATING		NOTE
S22	Switch,(HL20-NS)			
S23	Switch,(HL20-LSAB)			
S24	Switch,(HL20-LSAB)			
S25	Switch,(HL20-LSAB)			
S26	Switch,(HL20-NS)			
S27	Switch,(HL20-NS)			
S28	Switch,(HL20-LSAB)			
S29	Switch,(HL20-LSAB)			
S30	Switch,(HL20-LSAB)			
S31	Switch,(HL20-LSAB)			
S32	Switch,(HL20-LSAB)			
S33	Switch,(HL20-LSAB)			
S34	Switch,(HL20-LSAB)			
S35	Switch,(HL20-LSAB)			
S36	Switch,(HL20-LSAB)			
S37	Switch,(HL20-LSAB)			
S38	Switch,(HL20-NS)			

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( ): Manufacturer's part number

* : Selected at factory

Table 4-12 COMPONENT LIST FOR SWITCH CIRCUIT
(422U79287 P.C. BOARD), (Receiver Z8 Circuit Diagram 14)

CKT REF	DESCRIPTION	RATING		NOTE
J 1	Connector, (DF1-10P-2.5DSA)			
S 1	Switch,(DIP-A(8))			

( ): Manufacturer's part number
* : Selected at factory

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